

CORNELL UNIVERSITY

OFFICIAL PUBLICATION

MARCH 23, 1952

Graduate School

ANNOUNCEMENT
FOR 1952-53 SESSIONS



CALENDAR

1952

FALL TERM

Sept. 12	Last day for completing all requirements (including payment of graduation fees) for September degrees.
Sept. 22-23	Registration.
Sept. 24	Instruction begins at 1 p.m.
Oct. 7	Last day for filing statement-of-courses blank and change-of-committee blank and for new students to file candidacy blanks to receive residence credit for the term.
Oct. 14	Last day for payment of tuition for the term.
Oct. 25	Last day for taking qualifying and language examinations in order to have them considered as of the beginning of the term.
Nov. 26-30	Instruction ends at 12:50 p.m., Nov. 26. Thanksgiving recess.
Dec. 20	Instruction ends at 12:50 p.m. Christmas recess.

1953

Jan. 5	Instruction resumes at 8 a.m.
Jan. 23	Last day for completing all requirements (including payment of graduation fees) for February degrees.
Feb. 4	Term ends.

SPRING TERM

Feb. 6-7	Registration.
Feb. 9	Instruction begins at 8 a.m.
Feb. 21	Last day for filing statement-of-courses blank and change-of-committee blank and for new students to file candidacy blanks to receive residence credit for the term.
March 1	Last day for filing applications for scholarships and fellowships for 1953-54.
March 2	Last day for payment of tuition for the term.
March 6	Last day for taking qualifying and language examinations in order to have them considered as of the beginning of the term.
March 28	Instruction ends at 12:50 p.m. Spring recess.
April 6	Instruction resumes at 8:00 a.m.
May 28	Last day for completing all requirements (including payment of graduation fees) for June degrees.
June 9	Term ends.
June 15	Commencement.

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CORNELL UNIVERSITY
OFFICIAL PUBLICATION

The Graduate School

1952-53

The Culinary School

1855-56

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ADMINISTRATION

- DEANE W. MALOTT, A.B., M.B.A., LL.D., President of the University.
THEODORE P. WRIGHT, B.S., D.Sc., Vice President for Research.
CHARLES W. JONES, Ph.D., Litt.D., Dean of the Graduate School.
JOSEPH C. HINSEY, Ph.D., D.Sc., Associate Dean of the Graduate School.
DAMON BOYNTON, Ph.D., Secretary of the Faculty.
MAYFRED STIMMING, B.S. in Ed., Secretary to the Dean.

GENERAL COMMITTEE

- Professor WILLIAM R. SEARS, at large, term expires 1954.*
Professor SYDNEY A. ASDELL, at large, 1952.
Professor HAROLD H. WILLIAMS, at large, 1953.
Professor LLOYD P. SMITH, at large, 1953.
Professor WALTER H. FRENCH, Group A (Languages and Literatures), 1954.
Professor HENRY GUERLAC, Group B (History, Political Science, Law, Philosophy, Psychology, Agricultural Economics, Farm Management, Rural Sociology), 1953.
Professor WILLIAM T. MILLER, Group C (Mathematics, Astronomy, Physics, Chemistry, Geology, Geography, Geodesy), 1953.
Professor GEORGE C. KENT, Group D (Biological Sciences), 1953.
Professor JOSEPH G. TARBOUX, Group E (Engineering, Architecture, Agricultural Engineering, Landscape Design), 1954.
Professor JACOB H. BRUCKNER, Group G (Agricultural Sciences), 1952.
Professor MARGARET HUTCHINS, Group I (Education), 1954.
Professor JOHN W. MCCONNELL, Group J (Division of Industrial and Labor Relations), 1952.
THE SECRETARY OF THE FACULTY, *ex officio*.
THE DEAN, *Chairman ex officio*.

The office of the Graduate School is in Edmund Ezra Day Hall, Room 125. The office hours are 8:30 a.m. to 12:00 m. and 1:00 p.m. to 4:00 p.m.

THE GRADUATE SCHOOL

THE FUNCTION of the Graduate School is promotion of advanced scholarly work and research. The Graduate School offers facilities for advanced study and research so that students may obtain a comprehensive view of a field of knowledge and receive the training required for independent investigation in that field. In providing this opportunity, the School makes it possible for the students to associate freely with mature scholars who will give them such aid and direction as they may need. Accomplishment is judged primarily by the evidence of growing responsibility for the advancement of knowledge and not by fulfillment of routine requirements or by courses and credits. The Graduate Faculty requires of all candidates for advanced degrees a period of study in residence, the mastery of some one subject, an adequate acquaintance with allied subjects, the passing of a final examination, and the presentation of a satisfactory essay or thesis.

Within five years after Cornell University opened its doors to undergraduates in 1868, the Faculty admitted the first graduate student. Graduate instruction continued as a primary responsibility of the General, and later the University, Faculty until 1909, when the Graduate Faculty was established "with exclusive jurisdiction over all graduate work and any degree beyond the first degrees given by any school or college." *

The Graduate Faculty now consists of a permanent academic staff, numbering about six hundred, who are or who have been members of Special Committees directing candidates for advanced general degrees. This Faculty, with a few exceptions, is drawn from the University Faculty, which exceeds one thousand members. The General Committee is the administrative board of the Graduate Faculty,

*On the recommendation of the Graduate Faculty, the Board of Trustees has established the Graduate School of Medical Sciences in New York City. With the annual approval of the Graduate Faculty, the Faculty of Medicine exercises complete jurisdiction over graduate instruction in that School, including programs leading to the degrees of Master of Science and Doctor of Philosophy. Because of the separate jurisdiction, this *Announcement* does not describe instruction in the Graduate School of Medical Sciences; inquirers interested in the instructional programs of that School should address the Associate Dean of the Graduate School, Cornell University Medical College, 1300 York Avenue, New York 21, N.Y., or consult the *Announcement of the Medical College*.

The following are advanced degrees which are also first degrees of a school or

elected by the Faculty in part to represent Groups having common interests and in part to represent the Faculty as a whole. The Dean of the Graduate School is chairman ex officio.

ADVANCED GENERAL DEGREES (M.A., M.S., and Ph.D.)

The Graduate Faculty distinguishes in purpose and in administration between two types of advanced degrees: *general* and *professional*.

The authority to establish and administer rules for admission to candidacy for, and for graduation with, the *advanced general degrees* of Master of Arts, Master of Science, and Doctor of Philosophy, except in the Graduate School of Medical Sciences, is exercised directly and solely by the Graduate Faculty without regard for collegiate or departmental lines. The training is designed to develop respect for truth and independent responsibility for achieving it. As far as is consonant with correct method, each candidate's program is individual and is planned to utilize all relevant resources of the University. However, for convenience in directing and executing these programs, the Faculty lists separate Fields of Instruction (specifically described below) and the principles of instruction inherent in each.

The regulations governing programs for advanced general degrees are published in a pamphlet entitled *Code of Legislation* of the Graduate Faculty, which is available for consultation in all offices of the University. What is stated in this *Announcement* is not regulatory but descriptive.

ADMISSION

To be admitted, an applicant (1) must hold a baccalaureate degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree; (2) as judged by college and therefore are not subject to the jurisdiction of the Graduate Faculty. For information regarding them address the school or college indicated:

Bachelor of Laws	(Law School)
Master of Aeronautical Engineering	(Graduate School of Aeronautical Engineering)
Master of Business Administration	(School of Business and Public Administration)
Master of Nutritional Science	(School of Nutrition)
Master of Public Administration	(School of Business and Public Administration)
Doctor of Medicine	(Medical College, New York City)
Doctor of Veterinary Medicine	(Veterinary College)

his previous scholastic record, or otherwise, must show promise of ability satisfactorily to pursue advanced study and research; and (3) must have had adequate preparation to enter upon graduate study in the Field chosen. Since instruction is largely individual, the professors in each Field have a restricted allotment of students. Therefore, it often happens that a qualified applicant cannot be accepted because the places available in a Field have been exhausted. Failure to admit an applicant is not to be regarded as a judgment that the applicant is unqualified.

Although applications may be filed at any time, the Admissions Committee cannot give assurance that an application for the fall term received after the preceding March 1, or for the Summer Session after May 1, will receive the same consideration that it would receive if filed before those dates.

Normally, an applicant is admitted as a candidate for a particular degree with his major study in a particular Field. Sometimes, either because the applicant is not certain of his plans or because the Admissions Committee is not certain of his ability or prerequisite training, he is admitted as a noncandidate (see p. 15) with the possibility of transferring to candidacy after a limited period of resident study.

Inquiries about admission and requests for application forms should be addressed to the Graduate School, 125 Edmund Ezra Day Hall, Cornell University, Ithaca, N.Y. An application for admission must be made on the proper form; it will not be acted upon until all credentials enumerated in the form have been received.

In addition to presenting these credentials, any applicant residing in the United States is required to take the Graduate Record Examination Aptitude Test and to have the scores forwarded to the office of the Graduate School if he is applying for major work in one of the following Fields: Conservation (Aptitude and Profile Tests), English Language and Literature (Aptitude, Profile, and Advanced Tests), Geology and Geography, History (Aptitude and Profile Tests), Zoology. If for satisfactory reasons it is not feasible for an applicant in these Fields to take the examination before his application is considered, the Admissions Committee may act provisionally, pending submission of scores at a later date.

Although the test is not required in other Fields, the Admissions Committee welcomes submission of any Graduate Record Examination test scores as additional helpful data which it will consider in acting upon an application.

The Graduate Record Examination is administered four times each year throughout the United States and Canada. It does not require any special preparation and may be taken upon application and the payment of moderate fees. Inquiries about the examination and applications for taking it should be addressed to the Educational Testing Service, P.O. Box 592, 20 Nassau St., Princeton, N.J.

Readmission. A candidate who maintains good standing may register in successive terms until he completes the degree for which he is a candidate. Candidacy is canceled by (1) completion of requirements for the degree; (2) action of the General Committee upon evidence of failure to maintain good standing; (3) formal withdrawal arranged with the Dean; (4) failure to register during four successive years.

To be readmitted, a student must apply in writing to the Dean. He need not duplicate his original application and credentials, but he has to submit such new evidence as the Admissions Committee needs in order to approve readmission. In readmitting a student who has not registered for four or more years, the General Committee will stipulate what previous credits may be recovered.

A student who has fulfilled requirements for a Master's degree may become a candidate for the doctorate only after approval of his request by the Admissions Committee.

DUPLICATION OF DEGREES

The Graduate Faculty receives occasional inquiries regarding candidacy for a second Master's or a second Doctor's degree, usually because the inquirer wishes to take major work in another field. Since the primary purpose of programs leading to advanced general degrees is acquirement of method and not acquirement of specific knowledge, the Graduate Faculty does not grant a second general degree at the same level. The holder of an advanced degree should consider applying as a noncandidate (see below). In justifiable instances, the holder of an advanced professional degree may become a candidate for an advanced general degree, or vice versa.

REGISTRATION

All students taking work in the Graduate School must register both in the Graduate School * and with the Registrar of the University

*Candidates for advanced professional degrees (p. 13) register at the office of the Division instead of the Graduate School.

at the beginning of each term or session, including an approved period of Summer Research. For regular terms this registration takes place at Barton Hall on registration day. The Registrar notifies all students of the hour at which they are to report; if a graduate student does not receive notification at least a week before registration day, he should communicate with the Graduate School. In the process of registration at Barton Hall, every graduate student must report to the table of the Graduate School, where he will receive directions for completing his registration. Registration must be made in person, not by proxy. If a student cannot register at the appointed hour, he must report to the Graduate School office at the earliest time thereafter, bringing a written explanation endorsed by his adviser or chairman. A fee of \$5.00 is required for late registration by matriculated students, not as a fine but as a payment of additional cost to the University for registering a student out of phase.

A registered student who for any reason discontinues his work during a term should immediately report that fact to the Graduate office in order to obtain an official withdrawal and any refund of tuition or fees that he may be entitled to.

MAJOR AND MINOR SUBJECTS

The curriculum of a candidate for the degree of M.A. or M.S. is one major and one minor subject; of a candidate for the degree of Ph.D., one major and two minor subjects. No variation in number of subjects is allowable. Approved subjects are listed below under the separate Fields of Instruction, where some information is given about them. Specific requirements for each subject are fixed by the member of the Faculty who represents the subject on the candidate's Special Committee; he requires whatever in his judgment is necessary to train the candidate, including registration for courses and seminars and supervised or independent study. Therefore, the program of one candidate bears no necessary relation to the program of another candidate registered for the same subject. The Faculty believes that in the main the ultimate aims of candidacy are best attained by the candidate's selecting one minor subject (in certain instances two) outside the Field of his major subject. It also believes that candidates with major subjects in applied Fields usually should select minor subjects in basic Fields.

Within two weeks of first registration and after consultation with members of the Faculty, a candidate must record his selection of major

and minor subjects with the Dean. Thereafter, the Faculty permits candidates to change subjects whenever a change appears to be beneficial and feasible, but any change must immediately be reported to the Dean for approval.

SPECIAL COMMITTEES

Special Committees are the means for directing individual candidates in the attainment of the scholarly independence implicit in advanced degrees. While a candidate is choosing his major and minor subjects, he selects eligible members of the Cornell staff to represent each subject and to serve as his Special Committee. The representative of the major subject is chairman. Any professor, associate professor, or assistant professor, or any instructor who holds the degree of Ph.D. is eligible if his primary duties are Cornell University teaching and research on the Ithaca campus. If the candidate wishes, he may select two representatives for any subject; the second representative may be a member of the staff of the Agricultural Experiment Station at Geneva.

The members selected indicate their willingness to serve by signing the record of major and minor subjects, which is filed with the Dean.

A candidate may change the membership of his Special Committee with the approval of all the members of the newly constituted Committee and of the Dean.

Members of the Special Committee not only instruct or supervise the instruction of a candidate, but also certify each term whether his progress is satisfactory or unsatisfactory, conduct qualifying and final examinations, and approve the thesis. Although they are the candidate's advisers, he alone is responsible for meeting the requirements of the University and the Graduate School.

RESIDENCE REQUIREMENTS

The Faculty regards study in residence as essential. Although requisite depth results from intensive study of a major subject and properly related minor subjects, living with students working in a variety of fields provides balance through association in libraries and laboratories, at lectures, recitals, and exhibitions, in graduate organizations with special or general aims, and from daily contacts in a university community.

Consequently, the Graduate Faculty requires of each candidate for a Master's degree a minimum of two residence units, and for the

doctorate a minimum of six residence units. One residence unit represents one academic term of full-time study reported by the Special Committee as satisfactorily completed. The fractions of a unit counted toward this requirement, three-fourths, one-half, two-fifths, are granted for (1) study while assisting or instructing in the academic program of the University; (2) study in Summer Session or in on-campus instruction of the Division of Extramural Courses (four-fifths of a unit may under certain circumstances be off-campus); (3) study while employed in nonacademic work; (4) study which is reported by the Special Committee as only partially satisfactory. Eligibility to receive residence units and fractions of units is determined by regulations of the Graduate Faculty.

Transfer of residence. Since no degree is granted unless the candidate has studied in residence for at least two semesters, no residence unit or fraction is granted in fulfillment of the requirements for a Master's degree for study outside this Graduate School, except that one Cornell University Summer Session may be accepted. For study in another recognized graduate school while in candidacy for an advanced degree, up to three units may be accepted in fulfillment of doctoral requirements by special action of the Dean, and, in an exceptional instance, more than three units by action of the General Committee. No commitment may be made for acceptance of previous study in another graduate school in lieu of required residence until after the candidate has entered into study in residence in the Graduate School. Then the residence units recommended by the Special Committee on the basis of a transcript of record may not exceed those that would be earned under similar circumstances at Cornell. Study as a candidate or as a special student in an undergraduate college is not acceptable, even though the courses may be designed for graduate students. A candidate for the degree of Ph.D. must complete two of the last four units in successive terms of study on the Cornell campus.

Each candidate for an advanced degree is expected to complete his study in residence with reasonable continuity. Under any circumstances, a candidate who fails to register during any period of four or more years is dropped from candidacy and may be readmitted only after the General Committee has stipulated the amount of additional residence to be required. No more than ten years may intervene between the time of first registration for and the completion of all requirements for a degree.

Under published regulations, candidates who have studied in resi-

dence for two semesters or more may receive one-half unit (in exceptional instances, three-fourths) for *Summer Research*, but no candidate may be recommended for the degree at an earlier date than if all his work had been done during the regular sessions of the academic year.

Summer Session. A normal program in the six-week Summer Session, approved in advance and reported as satisfactory by the Special Committee, is accepted as two-fifths of a unit, providing the candidate has registered in both the Summer Session and the Graduate School. Requirements for Masters' degrees may be completed solely in the Summer Sessions, if instruction in the chosen major and minor subjects is offered. Only two residence units (in exceptional instances, three) for study in the Summer Session may be accepted in fulfillment of requirements for the doctorate. In order to help a student become acquainted with the School and Faculty before entering candidacy, the Faculty allows the transfer of one Summer Session of study before admission to candidacy as two-fifths of a residence unit in fulfillment of requirements in candidacy.

Division of Extramural Courses. Under published regulations, candidates employed within and outside the University may be granted residence units for work in the Division of Extramural Courses, which offers instruction in certain Fields both on the campus and off. The amount and range of such study are comparatively restricted.

LANGUAGE REQUIREMENTS

For the Master's degree. Students taking major work in certain Fields are required to have obtained reading knowledge of foreign languages, as indicated under the separate Fields of Instruction. The language or languages required and the time and the method of fulfilling the requirement are stated there. If the Field requires *proficiency*, the candidate must request at the Graduate Office assignment for an examination; the examination must be passed within one month of first registration, unless the Field stipulates a later time. If the Field requires *college-entrance language*, the candidate's transcript of record must indicate that he has passed three college entrance units in one language or two units in each of two languages or its equivalent in collegiate study; if his transcript does not indicate that he has met this requirement, he must demonstrate proficiency in one language, as described above. A candidate who does not demonstrate proficiency within one month of first registration will be required to complete a minimum

of three residence units for the degree and must demonstrate proficiency before beginning the third residence unit. The extra unit may be waived under regulations stated in the next paragraph. *Any Special Committee may, in its discretion, require knowledge of foreign language beyond the announced requirements.*

For the degree of Ph.D. Every candidate must demonstrate his ability to read French and German or substitutes allowed by regulations of the Faculty and approved by the Special Committee. The examination in at least one foreign language must be passed immediately upon admission to candidacy; otherwise, a minimum of seven residence units is required. The extra unit may be waived by the General Committee upon recommendation of the candidate's Special Committee if preparation in foreign language is made during a period when the candidate is not receiving residence units. The second language examination should be taken as soon as possible after admission to candidacy. Until it is passed, no residence units beyond four will be allowed. Examinations passed within one month after registration are considered as being passed at the time of registration.

Foreign students may, under regulation, offer English as one foreign language.

COURSES AND REGISTRATION OF COURSES

The Graduate School is not a course-offering agency, and courses and course credits are not directly a part of programs leading to advanced general degrees. The Graduate Faculty has never formally differentiated between undergraduate and graduate courses offered by the co-operating departments, schools, and colleges; nor has it regulated the type or number of courses which a graduate student may take. The Special Committee of a candidate is exclusively the judge of whether he can efficiently prepare himself for its requirements by formal participation or visiting courses or seminars or by other means. On recommendation of the Special Committee and with the consent of the instructor, a graduate student may register for any course offered by any department, school, or college of Cornell University. Completion of courses creates no necessary presumption that the student's progress is satisfactory; this judgment is rendered only by the Special Committee.

However, as a service to candidates who need evidence of completed courses for their Special Committees and for other purposes later, and

to the University administrators of course instruction, each candidate is required to register with the Graduate School office within two weeks of the beginning of each term (one week in Summer Session) all the courses and seminars he plans to take. Any change in this program must be reported immediately to the Graduate office.

All courses and seminars of interest to candidates are described in the Announcements of the schools and colleges, which are sent upon request to the office of Official Publication, Cornell University. In the description of Fields of Instruction below, the name of the school or college offering courses in each Field is given in parentheses immediately after the name of the Field. Also, the Registrar of the University issues the *University Schedule of Courses*, which lists all courses offered in the University in any particular term. Courses and seminars exclusively or primarily for graduate students are offered in all Fields of Instruction.

Preregistration. Immediately after notice of admission, a prospective candidate, especially in laboratory sciences, should consult, or communicate with, the Representative in the Field of his major subject, or with any other member of the Field who is advising him, with regard to any courses or seminars he may need to take during his first term. Otherwise, he may be refused a place at registration day because the course is filled. The Graduate School office notifies students in residence regarding the time at which they need to pre-register for courses in the subsequent term.

EXAMINATIONS REQUIRED BY THE GRADUATE FACULTY

Three oral or oral and written examinations are required by the Graduate Faculty: (1) a Final Examination for the Master's degree; (2) a Qualifying Examination for the degree of Ph.D.; (3) a Final Examination for the degree of Ph.D. Under certain regulations (1) and (2) may be combined. Although other members of the Faculty may be invited to examine the candidate, the Special Committee alone decides whether he has passed or failed. The Qualifying Examination has the double purpose of determining the ability of the candidate to pursue doctoral studies and of allowing the Special Committee and candidate to plan together a satisfactory program for completion of candidacy. The Qualifying Examination should be taken as early as possible; at all events, the candidate must complete at least three

units of residence after passing it. The Final Examination for the doctorate may be given in two parts—one part, on major and minor subjects, as much as two terms before the second part, on the thesis and related material. Final Examinations are scheduled by the Dean and are announced to the Graduate Faculty so that any member may attend who wishes to do so.

The Special Committee may require any examinations in addition to these three which it deems desirable.

ESSAYS AND THESES

Programs in candidacy for the Master's degree are intended to be individually planned and may range widely in content and method. Depending upon the desires and needs of the candidate and the discretion of the Special Committee, they may be composed largely of courses in broad or restricted fields or of informal study under guidance; they may be designed to terminate formal education or to prepare for further advanced study; they may center in a single problem or investigation, or the thesis or essay may be secondary. But at least five days before the Final Examination, the candidate must submit an essay or thesis approved by all members of his Special Committee which is acceptable to the Graduate Faculty in both scholarship and literary quality.

A candidate for the doctorate must present a thesis approved by all members of the Special Committee, which is acceptable to the Graduate Faculty in both scholarship and literary quality and which demonstrates the candidate's respect for truth and independent responsibility for achieving it. Ordinarily, but not necessarily, the thesis is written in the candidate's major field and under the direction of the chairman of his Special Committee.

In conformity with the desire of the Graduate Faculty for the widest possible circulation and criticism of theses and the material of theses, theses may not be classified or otherwise restricted in circulation. The Faculty may require the publication of an abstract and of parts or all of completed doctoral theses, probably through University Microfilms, Inc. Fees for this service and for binding are about thirty dollars.

ADVANCED PROFESSIONAL DEGREES

Advanced professional degrees are designed as preparation and training for a special profession. The admissions, requirements, and curricula

for such degrees, as approved by the Graduate Faculty, are announced and administered by the Faculty of a professional school or college, which, for the purpose, acts as a Division of the Graduate Faculty. Degrees are awarded upon recommendation of the Division to the Graduate Faculty. Because of the separate administration, no further information regarding admission or academic requirements for these degrees is included in this *Announcement*. Inquiries addressed to the Graduate School will be forwarded to the proper official. As of February 1, 1952, the following professional degrees are approved by the Graduate Faculty:

Master of Architecture (M.Arch.). Advanced training in architectural design, construction, and research. Only graduates of a five-year professional program in architecture are admitted as candidates. (Professor T. W. Mackesey)

Master of Fine Arts (M.F.A.). Advanced training in the practice of painting or sculpture. (Professor J. A. Hartell)

Master of Landscape Architecture (M.L.A.). Advanced training in landscape design. (Professor F. W. Edmondson)

Master of Regional Planning (M.R.P.). Training for a professional career in the fields of city planning or regional planning. (Professor J. W. Repts)

These degrees are administered by the Division of Architecture and Fine Arts. Inquiries should be addressed to the listed professor.

Master of Laws (LL.M.). This degree is intended primarily for a student who desires to increase his knowledge of the law by working in a specialized field.

Doctor of the Science of Law (J.S.D.). This degree is intended for a student who desires to become a proficient scholar by original investigation into functions, administration, history, and progress of law.

These degrees are administered by the Division of Law.

Master of Education (M.Ed.). This degree is granted upon the satisfactory completion of a program of preparation for professional services in education, such as teaching, administration, student personnel work, and supervision.

Doctor of Education (Ed.D.). The program for this degree is designed to prepare the candidate within a broad cultural context for professional leadership in a selected field of education.

These degrees are administered by the School of Education.

Master of Chemical Engineering (M.Chem.E.)

Master of Civil Engineering (M.C.E.)

Master of Electrical Engineering (M.E.E.)

Master of Engineering Physics (M.E.P.)

Master of Mechanical Engineering (M.M.E.)

Master of Metallurgical Engineering (M.Met.E.)

Graduate study leading to these professional degrees has as its major objective the development of a more profound and thorough understanding of basic scientific principles and their application to creative engineering work.

These degrees are administered by the Division of Engineering.

Master of Science in Industrial and Labor Relations (M.S. in I.L.R.).

The program leading to this degree provides a basic course of graduate study for those with professional interests in industrial and labor relations and further provides limited opportunities for specialized professional study where broad competence has been established.

This degree is administered by the Division of Industrial and Labor Relations.

NONCANDIDATES

Wherever staff and facilities are available in the University, the Graduate School is an agency for the special training of adults holding a baccalaureate degree or the equivalent. Applicants may be admitted as noncandidates and register for such formal or informal instruction as they are adequately prepared for. The work of such a noncandidate is under the supervision of an adviser selected by the student and approved by the Dean. He is subject to the general regulations of the Graduate Faculty and of the University.

An applicant for admission as candidate for an advanced degree may be advised by the Admissions Committee to enter as a noncandidate because his record or statement of training and intentions does not clearly indicate his ability to pursue study in candidacy. In such instances the noncandidate may reapply for admission to candidacy after a period of study on campus not exceeding two semesters. If he is admitted into candidacy, he is not allowed to transfer in fulfillment of residence requirements more than one semester or one Summer Session of study, whichever is shorter.

GENERAL INFORMATION

CORNELL University regularly publishes a pamphlet, *General Information*, which describes the complete educational program of the University. It will be sent without charge to anyone applying to the Official Publication office, Cornell University. The information given below is that part which particularly relates to graduate students.

TUITION AND OTHER FEES*

Tuition and other fees become due when the student registers. The University allows twenty days of grace in each term, five days in the six-week Summer Session. The last day of grace is generally printed on the registration coupon which the student is required to present at the Treasurer's office. Any student who fails to pay his tuition charges, other fees, and other indebtedness to the University, or who, if entitled to free tuition, fails to claim it at the Treasurer's office and to pay his other fees within the prescribed period of grace, is thereby dropped from the University unless the Treasurer has granted him an extension of time to complete payment. The Treasurer is permitted to grant such an extension when, in his judgment, the circumstances of a particular case warrant his doing so. For any such extension the student is assessed a fee of \$2. A reinstatement fee of \$5 is assessed against any student who is permitted to continue or return to classes after being dropped from the University for default in payments. The assessment may be waived in any instance for reasons satisfactory to the Treasurer and the Registrar, when such reasons are set forth in a written statement.

Students registering at any time during the last ten weeks of any term are required to pay tuition at the rate of 10 per cent of the regular tuition of the term for each week or fraction of a week between the day of registration and the last examination day of the term. Students registering at any time during the last five weeks in the short summer courses are required to pay tuition at the rate of 20 per cent of the term's tuition for each week or fraction of a week between the day of registration and the last examination day of the term.

*This statement is prepared by the Treasurer, who alone is authorized to interpret it.

A tuition fee or other fee may be changed by the Trustees at any time without previous notice.

FEES PAYABLE BY GRADUATE STUDENTS

Registration deposit. A deposit of \$30 must be made by every applicant for admission after the applicant has received provisional notice of acceptance, unless the candidate has previously matriculated as a student at Cornell University. Of this deposit \$18 is used to pay the matriculation fee, chest X-ray, and examination blank charge; the \$12 balance is a guaranty fund that must be maintained with the Treasurer until the student graduates or permanently withdraws.

A *tuition fee* of \$150 a term is to be paid by all students registered in the Graduate School with major concentration in subjects within the state-supported colleges of the University; all others must pay a fee of \$350 a term. This fee is payable at the beginning of each term.

Certain classes of students are exempt from the payment of the tuition fee. They are:

1. Graduate students holding certain appointments as University Fellows or Graduate Scholars, and holders of certain temporary fellowships and scholarships.

2. Resident Doctors upon recommendation, and Honorary Fellows.

3. In addition to students exempt under the charter of the University from the payment of tuition the following persons, to the extent herein mentioned, shall also be exempt from payment of fees:

Upon recommendation by the appropriate college dean and by action of the Board of Trustees, for each appointment in a state-supported school or college, waiver of tuition in the Graduate School may be made to a member of the teaching or scientific staff, whose major field of study is in a state-supported school or college, subject to the following limitations:

- (a) If the salary for the academic year is not greater than \$1600, the tuition fee may be waived entirely;

- (b) If the salary is greater than \$1600, but not greater than \$1700, 25% of the tuition will be charged and 75% waived;

- (c) If the salary is greater than \$1700, but not greater than \$1800, 50% of the tuition will be charged and the balance waived;

- (d) If the salary is greater than \$1800, but not greater than \$1900, 75% of the tuition will be charged and the balance waived;

- (e) If the salary is greater than \$1900, no waiver will be made.

The word salary as used above means total pay, that is, base pay plus any bonus.

Graduate assistants on the nine- or twelve-month basis who reside here during the summer, who are registered for Summer Research for credit in the Graduate School, and who are required to give service in their department or college during that period may be recommended for waiver of tuition during

the summer period under the above limitations. This waiver of tuition does not apply if the student registers in the Summer Session. Those who are engaged only in graduate study and not doing productive work for the department during the summer may not have their tuition waived. The amount of tuition to which the above percentages will be applied is the prorated amount of the full tuition fee based upon the maximum amount of residence units that can be earned.

By recent action of the Board of Trustees, candidates who have completed minimum residence requirements are no longer eligible for waiver of tuition except within the limits stated above.

A *College and University fee* of \$60 a term, payable at the beginning of each term, is required of all students registered in the Graduate School except Honorary Fellows and Resident Doctors. This general fee contributes toward the services supplied by the libraries, Clinic and Infirmary, and the student union in Willard Straight Hall, and pays a portion of the extra cost of laboratory courses and general administration.

A graduate student who returns to the University to present his thesis and to take the final examination for an advanced degree, all other work for that degree having been previously completed, shall register as a "candidate for degree only" and shall pay only an administration fee of \$27.

A *matriculation and X-ray fee* of \$18 is required of every student upon his first entrance into the University. This fee is deducted from the registration deposit of \$30, which must be paid when the student is approved for admission.

A *graduation fee* of \$10 is required of every candidate for an advanced degree. The fee will be returned if the degree is not conferred.

A *laboratory and library fee* of \$9 a term is required of graduate students registered as Honorary Fellows or Resident Doctors.

Refunds of tuition and other fixed fees will be made to students who withdraw from the University, prior to the completion of a term, for reasons accepted as satisfactory. For students who do not complete a term, tuition and other fees will be charged at the rate of 10 per cent for each week, or fraction of a week, from the first day of registration to the date of withdrawal as certified by the College; provided, however, if withdrawal is made within six days of the date of registration, no charge is assessed. The matriculation fee will not be refunded, nor will refund of the health and infirmary fee be made to a student who has been admitted to the Infirmary.

Fees for the Summer Session. Graduate students who attend classes in

the Summer Session must register both in the Graduate School and in the Summer Session; they must pay a tuition fee of \$77, plus a fee of \$13 for services supplied by the Clinic and Infirmary, the student union, and general administration, and also laboratory fees as listed in the *Announcement of the Summer Session*.

Motor vehicle registration and parking fees. Any student, unless he has the rank of instructor in Cornell University, who owns, maintains, or for his own benefit operates, or has in charge, a motor-driven vehicle in Tompkins County, is required to register his vehicle in person with the Campus Patrol, and, unless it is owned by another member of his immediate family who is a resident of Tompkins County, to pay a registration fee of \$2 a term. He must present (a) written consent of his parent or guardian if he is under 21 years of age, (b) evidence that the vehicle may be legally driven in New York State, (c) evidence that the operator may legally drive in New York State, and (d) evidence that the vehicle is effectively insured against public liability for personal injury and property damage for the standard minimum of 10,000, 20,000, 5,000. This registration, which includes obtaining a registration sticker and paying the fee, must be completed within the registration days at the beginning of the first term if the student is then subject to the rule. If he becomes subject to the rule after that time, he has one week in which to comply with it. Late registration of a vehicle makes the student liable to a penalty of \$2.

Motorcycles must be registered but may not be used anywhere on the campus during class hours.

Student parking on the campus during University hours is *prohibited*. Exemption may be granted by the Campus Patrol when the use of the car is essential to the student's attending classes or carrying on his academic or departmental work.

During the Summer Session, the rules are the same.

The student's registration in the University is held to constitute an agreement on his part that he will abide by its rules and regulations with regard to traffic and parking or suffer the penalty prescribed for any violation of them. All privileges here indicated may be denied a student who is not in good standing.

Summer Research. Students carrying on Summer Research are required to register with the Registrar as well as in the Graduate School.

Students registered for Summer Research, if they desire residence units for their work, must pay a tuition fee proportionate to the unit

period in regular terms. Such students must pay the College and University general fee of \$30.00 if the period is eight weeks, or \$60.00 if the period is twelve weeks. Such payment admits the student to the current Summer Session classes without additional tuition payments, provided that the tuition paid is at least equal to that charged students registered in the Summer Session. Students registered for Summer Research during the summer, not for units, are exempt from the payment of tuition, but may not attend, either as visitors or for subsequent credit, any of the classes or exercises of the Summer Session.

The privilege of Summer Research without the payment of tuition shall be restricted to candidates who have been in residence during the preceding academic year.

FELLOWSHIPS, SCHOLARSHIPS, PRIZES, LOANS

Award and tenure. Appointments to fellowships and scholarships are made on April 1 of each year by vote of the Graduate Faculty on nomination of the Fields indicated. Forms for making application may be obtained from the Graduate office. These applications, together with supporting documents, must be filed in the office of the Graduate School on or before the *first* of March.

Appointments are made for one academic year. The holder of a fellowship must devote his whole time to his studies; he may not accept any other appointment. The holder of a scholarship may, on approval of the Dean, accept another appointment.

The stipends of fellowships and scholarships are payable at the office of the Treasurer of the University in eight or twelve equal installments, at the option of the holder thereof, with the first payment due October 15 and the other payments due on the fifteenth of each succeeding month.

Honorary fellowships. See page 37.

ENDOWED AND UNIVERSITY FELLOWSHIPS AND SCHOLARSHIPS

All of the following fellowships and scholarships, except the few marked with an asterisk, provide full exemption from tuition, but not from required fees. The amount in dollars listed with the description of the fellowship does not indicate the amount of the award, but the annual income available *in addition to tuition*. The Faculty may increase

the amount of the stipend by use of accumulated surplus, or it may combine two or more scholarships or fellowships, or it may divide a fellowship into two or more scholarships. Since it is common practice for the Faculty to award one of the listed fellowships in alternate years, the stipend may be doubled.

GENERAL

Tuition Scholarships

Thirty-four tuition scholarships for graduate students, four of which are specified for students in Industrial and Labor Relations. They entitle the holder to exemption from payment of tuition, but not fees, for the duration of the appointment.

Allen Seymour Olmstead Fellowships

Two Allen Seymour Olmstead Fellowships, \$1,100 each, are open to graduate students in any field of study in which major work for the degree of Ph.D. is offered.

Glasgow University Exchange Fellowship

By agreement between Cornell and Glasgow Universities, a graduate student enrolled in candidacy for an advanced degree is given the opportunity to study in Glasgow University during the academic year in the field of his choice. The appointee receives board, room, and tuition, and an allowance for travel. Residence units are allowed under the regulations governing study *in absentia*. For this fellowship, nominations are made before the preceding March 1 by the Special Committee to the General Committee.

Phi Kappa Phi Scholarship

Established by the Cornell chapter of Phi Kappa Phi, and open to graduate students in any field of study. In awarding the scholarship, preference is given to applicants who are members of Phi Kappa Phi. \$200.

Cornell Sigma Xi Fellowship

Established by the Cornell chapter of the Society of Sigma Xi and open to graduate students in the following fields of study: mathematics, physics, chemistry, astronomy, sciences of the earth, biology in its various branches including psychology, medicine in its various branches, anthropology, and engineering in its various branches. \$500.

AGRICULTURE

Two *Henry Strong Denison Fellowships in Agriculture*. \$1,000 each. These fellowships are distributed annually among the following fields: plant sciences, animal sciences, social sciences, and agricultural engineering. Preference will be given to those applicants who expect to complete the requirements for the doctorate and who appear most promising from the standpoint of ability to conduct research.

The *Clinton DeWitt Smith Fellowship in Agriculture*. \$400. This fellowship is limited to students who come from farm homes and who have had farm training. Applicants should submit detailed statements covering such experience.

THE GRADUATE SCHOOL

The University Fellowship in Agriculture. \$400.

See also Animal Biology, Botany, and Entomology.

ANIMAL BIOLOGY

The Simon Henry Gage Fellowship in Animal Biology. \$600.

The Schuyler Fellowship in Animal Biology. \$400.

The University Scholarship in Animal Biology. \$200.

The Morrison Fellowship in Livestock Feeding. \$1,000.

See also Agriculture and Entomology.

ARCHITECTURE

The University Fellowship in Architecture, Landscape Architecture, Fine Arts, and Regional and City Planning. \$400.

BACTERIOLOGY

Applicants who wish to pursue work in Bacteriology should apply for either the fellowships in Agriculture or the scholarship in Veterinary Medicine.

BOTANY

The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography. \$400. Awarded in alternate years.

The University Scholarship in Botany, Geology, or Physical Geography. \$200. Awarded in alternate years.

See also Agriculture.

CHEMISTRY

These fellowships are ordinarily awarded for the last year of residence for the doctorate.

The Sage Fellowship in Chemistry. \$600.

The Carl G. Schluederberg Fellowship. \$200.

The John E. Teeple Fellowship. \$1,000.

CLASSICS

The Fellowship in Greek and Latin. \$800.

Two University Scholarships in Greek and Latin. \$200 each.

ECONOMICS

The President White Fellowship in Political and Social Science. \$600. Awarded in alternate years in Government and Economics.

The University Fellowship in Political Economy. \$800.

ENGINEERING

The McGraw Fellowship in Civil Engineering. \$400.

The *University Scholarship in Civil Engineering*. \$200.

The *Sibley Fellowship in Mechanical and Electrical Engineering*. \$400.
(Ordinarily awarded for work in Mechanical Engineering.)

The *Charles Bull Earle Memorial Fellowship in Mechanical and Electrical Engineering*. \$400. (Ordinarily awarded for work in Electrical Engineering.)

The *Edgar J. Meyer Memorial Fellowship in Engineering Research*. \$400.
(Ordinarily awarded for work in Electrical Engineering.)

The *Elon Huntington Hooker Fellowship in Hydraulics*. \$500.

*The John McMullen Graduate Scholarships**

Open to candidates for advanced degrees in Aeronautical, Chemical, Civil, Electrical, or Mechanical Engineering. With the proceeds of the bequest the Board of Trustees has established fifteen scholarships of an annual value of \$1,200 each. The scholarships have not been assigned to any particular school of the College of Engineering.

ENGLISH

The *Martin Sampson Teaching Fellowship*. \$1,150. The incumbent teaches one class in English.

The *University Fellowship in English*. \$600. Ordinarily for first year.

ENTOMOLOGY

The *Comstock Scholarship in Entomology*. \$150.

See also Agriculture and Animal Biology.

GEOLOGY

The *Goldwin Smith Fellowship in Botany, Geology, or Physical Geography*. \$400. Awarded in alternate years.

The *Graduate Scholarship in Botany, Geology, or Physical Geography*. \$200. Awarded in alternate years.

The *Eleanor Tatum Long Graduate Scholarship* in Structural Geology is open to graduate students who are majoring in this branch of Geology. \$1,000.

*Charles Bean DeLong Graduate Research Fund**

A fund of \$6,000, the income from which is to be used at the discretion of the Department of Geology for the purpose of assisting male graduate students or assistants of the University who are majoring in and carrying out scientific research in economic or structural geology.

GERMAN

The *University Fellowship in German Studies*. \$400.

GOVERNMENT

The *President White Fellowship in Political and Social Science*. \$600. Awarded in alternate years in Government and Economics.

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HISTORY

These fellowships are ordinarily awarded only to applicants who have completed a year of graduate work or are able to submit written work of superior quality.

The *President White Fellowship in Modern History*. \$500. In the discretion of the Faculty this fellowship may be made a traveling fellowship with a stipend of \$800.

The *University Fellowship in American History*. \$400.

The *George C. Boldt Fellowship in History*. \$1,000.

The *University Scholarship in History*. \$200.

HOME ECONOMICS

The *Anna Cora Smith Fellowship*. \$400.

MATHEMATICS

The *Erastus Brooks Fellowship in Mathematics*. \$600.

NATURE STUDY

The *Comstock Scholarship in Nature Study*. \$150.

*American Nature Association Research Fellowships.**

Two or three American Nature Association research fellowships of \$400 to \$600 are available to graduate students in Nature Study. Applications should be addressed to Professor E. L. Palmer, 118 Fernow Hall, Cornell University.

PHILOSOPHY

Three *Susan Linn Sage Fellowships in Philosophy*. \$600 each. One or more of these fellowships may be divided to make two scholarships.

PHYSICS

The *President White Fellowship in Physics*. \$600.

PSYCHOLOGY

The *John Wallace Dallenbach Fellowship in Psychology*. \$800.

The *Susan Linn Sage Fellowship in Psychology*. \$400.

The *Susan Linn Sage Scholarship in Psychology*. \$200.

ROMANCE STUDIES

The *University Fellowship in Romance Studies*. \$400.

VETERINARY MEDICINE

The *University Scholarship in Veterinary Medicine*. \$200.

TEMPORARY FELLOWSHIPS

There are regularly available a number of other fellowships, usually offered by industrial concerns to graduate students in Cornell University. The list below indicates the fellowships now in existence.

CHEMISTRY

Allied Chemical and Dye Fellowship. \$1,200 plus tuition and fees.

Du Pont Company Postgraduate Fellowship. \$1,400 (single), \$2,100 (married), plus tuition and fees.

Eastman Kodak Fellowship. \$1,200 plus tuition and fees.

General Electric Fellowship. \$1,400 (single), \$2,100 (married), plus tuition and fees.

Procter and Gamble Fellowship. \$1,800 plus tuition and fees.

Shell Fellowship. \$1,200 plus tuition and fees.

United States Rubber Company Fellowship. \$1,200 (single), \$1,800 (married), plus tuition and fees.

Visking Corporation Fellowship in Chemistry. \$1,500 plus tuition and fees.

ENGINEERING

Avco Manufacturing Corporation Fellowship in Aeronautical Engineering. \$1,200 plus tuition and fees.

Curtiss-Wright Fellowship in Aeronautical Engineering. \$1,200 plus tuition and fees.

Fairchild Engine & Airplane Corporation Fellowship in Aeronautical Engineering. \$1,200 plus tuition and fees.

American Cyanamid Company Fellowship in Chemical Engineering. \$1,150 plus tuition and \$50 toward fees.

Du Pont Company Postgraduate Fellowship in Chemical Engineering. \$2,100 (married), \$1,400 (single) plus tuition and fees.

Standard Oil Company of Indiana Fellowship in Chemical Engineering. \$1,200 plus tuition and fees.

Texas Company Fellowship in Chemical Engineering. \$1,000 plus tuition and fees.

Republic Aviation Corporation Fellowship in Electrical Engineering. \$1,200 plus tuition and fees.

Bell Aircraft Corporation Fellowship in Electrical Engineering. \$1,200 plus tuition and fees.

Radio Corporation of America Fellowship in Engineering Physics. \$1,600 plus tuition and fees.

Celanese Fellowship in Engineering Physics. \$1,800 plus tuition and fees.

Westinghouse Educational Foundation Fellowship in Mechanical Engineering. \$1,200 plus tuition and fees.

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FAR EASTERN STUDIES

Eight *Training Fellowships on Southeast Asia*. \$1,600. These Fellowships in the Cornell Southeast Asia Program will be awarded each year to selected students who, while working for a higher degree in one of the several fields of instruction of the Graduate School, will at the same time follow a prescribed course of study and research devoted to Southeast Asia.

HOME ECONOMICS

Grant Foundation Fellowships in Family Life Education (2). \$2,800.

PHYSICS

Cornell Aeronautical Laboratory Fellowship. \$1,200 plus tuition and fees.

General Electric Fellowship. \$1,400 (single), \$2,100 (married), plus tuition and fees.

PLANT PATHOLOGY

Allied Chemical and Dye Fellowship. \$1,200 plus tuition and fees.

PLANT SCIENCE

Shell Fellowship. \$1,200 plus tuition and fees.

VETERINARY MEDICINE

Merck Research Fellowship in Pathology and Bacteriology. \$1,500.

OTHER FELLOWSHIPS

The Dean of the Graduate School maintains a file of information regarding fellowships nationally available for which graduate students at Cornell may apply.

PRIZES

Seven University prizes are open for competition to all students, including graduate students; the Committee on Prizes of the University Faculty publishes a descriptive list, which may be obtained from the Official Publication office, Edmund Ezra Day Hall.

Two other prizes are open exclusively to graduate students:

The Guilford Essay Prize. Until at least 1962, a special scholarship of \$120.00 will be assigned annually to that graduate student who, in the judgment of the Graduate Faculty, writes the best English prose. Each competitor must submit, at or before 12 o'clock of the last Monday in November, specimens of his English prose of in all not less than fifteen hundred words, preferably prepared as a normal part of his training in candidacy for an advanced degree.

The Philosophy Prize. A prize of \$25.00 is awarded to the graduate student who submits the best paper embodying the results of research in the field of philosophy. The subject of the paper may be historical or critical or constructive. It may be concerned either with problems of pure philosophy or with the philosophical bearing of the concepts and methods of the sciences. Papers must be submitted on or before the first day of May.

Papers submitted in competition for either prize must be typewritten, double-spaced, and signed with an assumed name, the real name of the competitor being enclosed in a sealed envelope, superscribed with the assumed name. They are to be deposited in the office of the Graduate School.

LOANS

Contributions from the alumni of Cornell University have made possible the establishment of a Graduate Student Loan Fund for use of graduate students already enrolled in Cornell University. Applications should be made to the office of the Dean of Men and Dean of Women. There are also loan funds for the use of women graduate students, provided by the Ithaca Branch of the Association of American University Women and the Mu Chapter of Pi Lambda Theta; written applications should be addressed to the office of the Dean of Women.

ASSISTANTSHIPS AND OTHER EMPLOYMENT

ASSISTANTSHIPS

The colleges, schools, and departments of the University regularly contract for the assistance of graduate students in teaching, research, and administration. The contracting parties and the Faculty of the Graduate School see that appointments and assignment of duties are made with proper consideration for the candidate's graduate program. Usually the duties of the assistant lie in the field of his major interest and contribute to his intellectual and technical proficiency in the field. Assistants are eligible for residence units in candidacy for advanced degrees according to regulations of the Graduate Faculty. Normally an assistant who is called upon for services not exceeding twenty clock-hours a week is eligible for three-fourths of a unit each term, but by earning an additional one-half unit in subsequent Summer Research, he may earn two units in one calendar year. Those desiring appointment should apply to the head of the department concerned. Applications mistakenly addressed to the Graduate School are forwarded to the proper department.

THE GRADUATE SCHOOL STUDENT DEANS

Women graduate students who are assistants in student personnel work are known as Student Deans. Student Deans have residence duties as laboratory experience and work on special projects of similar nature. They major in guidance and personnel administration or related fields. Appointees receive a scholarship consisting of room and board plus an honorarium. The honorarium may range from \$50 to \$300 a year, depending upon the program plans of the individual student. Applications should be addressed to Dean Lucile Allen, Edmund Ezra Day Hall.

OTHER EMPLOYMENT

The University maintains a placement service in the Office of the Dean of Men and Dean of Women, headed by Culver A. Smith, 143 Edmund Ezra Day Hall, for handling requests for part-time employment. Opportunities arise for normal types of student employment. If a candidate is temporarily employed at hourly rates on research projects and operations closely allied with his academic interests, he may find such employment valuable. However, progress in candidacy is seldom possible when a candidate attempts to support himself wholly or even partially by work requiring no high degree of technical or professional skill. He will find it sounder economy to borrow money.

LIVING FACILITIES

It is the responsibility of each graduate student to arrange for his own living quarters. Any time after January first, he should apply to the Department of Residential Halls, Edmund Ezra Day Hall, for specifically current information on both University and off-campus housing for the coming year.

The University does not operate separate housing units for graduate men. Upon application, they may be assigned to space, when available, within the Men's Undergraduate Temporary Dormitories. The yearly rates for single rooms in the Temporary Dormitories is \$227.00 and \$240.00; for doubles, \$182.00 and \$200.00.

Although the University does not normally operate separate housing units for graduate women, it has occasionally been possible in the past to divert one or more small cottages from undergraduate use for this purpose. Housing plans for 1952-53 do not include operation of a

graduate cottage; any deviation from the present schedule would be announced in July or August. On approval of application to the Dean of Women, Edmund Ezra Day Hall, graduate women under 21 years of age will be considered for assignment to undergraduate space. Such assignments entail room, board, and an allowance for personal laundry at regular undergraduate rates. Assignments are made only after all undergraduate placement is completed in September.

Facilities for married students include privately operated accommodations in Ithaca and surrounding area, and the temporary housing projects under University supervision which provide approximately 300 apartments for married veterans. Married veterans interested in temporary housing projects should apply to the Veterans' Housing Office, Edmund Ezra Day Hall, Cornell University, Ithaca. Other married students and those veterans who are on the waiting list for assignment to the housing projects should come to Ithaca well in advance of the beginning of the term and make their own arrangements.

The Department of Residential Halls maintains an Off-Campus Housing Office which serves as an information center for privately operated accommodations. Off-campus rooms range in price from \$5.00 to \$10.00 a week, the average being \$6.00 to \$7.00. It is rarely possible to arrange for room, board, and laundry at the same place off campus. There are, however, several restaurants and cafeterias on or near the campus which serve off-campus and University-housed students alike. The present estimated cost of board is \$2.25 to \$2.75 a day.

HEALTH SERVICES AND MEDICAL CARE

These services are centered in the University Clinic (out-patient department) and in the Cornell Infirmary (hospital). Students are entitled to unlimited visits at the Clinic; laboratory and X-ray examinations indicated for diagnosis and treatment; hospitalization in the Infirmary with medical care for a maximum of fourteen days each term and emergency surgical care. (Surgery for the correction of chronic remediable defects and obstetrical services are not included.) The cost for these services is included in the College and University general fee.

The following health requirements for entering graduate students have been adopted by the Board of Trustees of Cornell University.

The Board has also ruled that failure to fulfill these requirements will result in a recommendation to the Registrar that the student be denied the privilege of registering the following term.

(1) *Vaccination against smallpox.* A satisfactory certificate of vaccination against smallpox must be filed at the Graduate School office before registration. It will be accepted as satisfactory only if it certifies that within the last five years a successful vaccination has been performed or three unsuccessful vaccination attempts have been made.

(2) *Health history.* Students accepted for admission will be required to fill out Cornell student health record forms.

(3) *Chest X-ray film for permanent file at the Infirmary.* This chest film may be made by a private physician within a month of entrance and presented to the Clinical Director at the time of registration; otherwise, a chest radiograph will be made during the orientation period or registration week. A charge of \$2.00 for making this radiograph is included in the matriculation fee. When a student has been away from the University for any reason for a year or more, he must have another X-ray upon re-entrance, for which he will be billed.

COUNSELING AND PLACEMENT

The University maintains a variety of counseling services of the type needed by graduate students. The primary counselors are the members of the Special Committee. The Dean of the Graduate School will direct graduate students to other available services, including such agencies as the Deans of Men and Women, the University Testing Service, Cornell United Religious Work, and military and ROTC advisers.

The University Placement Service makes arrangements for interviews on and off campus with employers, supervises the assembling and presentation of personnel records, and assists Cornell men and women who are ready for positions in business and industry. The Educational Placement Service performs a similar function for those whose vocation is teaching. Many of the professional schools and colleges maintain separate placement offices for the special professions; their services are available to registered graduate students and alumni.

FOREIGN STUDENTS

Applications and all necessary credentials for admission should be

filed by foreign students several months before registration day. No student should apply who has not mastered colloquial English.

Before applying, a student from another country should be certain that he has sufficient available funds in dollars to meet all necessary expenses. Because of his unfamiliarity with local patterns of living and buying, he will need to calculate a somewhat higher amount for board, room, and travel than the amounts cited in this *Announcement* and elsewhere. He should, too, make arrangements for additional help in the event of protracted illness or other emergency. Students from foreign countries whose native language is not English or whose preparation differs from that of citizens of the United States should not expect to receive their degrees at the end of the minimum residence period. Moreover, agencies subsidizing such students should be prepared to support them for a longer period. Such students are usually unable to qualify for assistantships or for other appointments yielding financial assistance.

Within these limits, Cornell University welcomes students from other countries. In 1951-52, there were 410 students from 66 foreign countries registered in the University. The University maintains on its staff a Counselor to Foreign Students, Donald C. Kerr, whose duty is to look after the welfare of all students from other countries. He may be consulted on personal problems, social questions, or any other matter in which he may be helpful. His office is in Edmund Ezra Day Hall, Room 144. All foreign students should write him before coming to Ithaca or call on him immediately upon arrival. He will be glad to help them find suitable living quarters and introduce them to other University officials and members of the Faculty.

ORGANIZATIONS FOR GRADUATE STUDENTS

There are places for graduate students in some extracurricular activities shared by undergraduates, such as intramural sports, drama, publications, music, and the other arts. In the main, however, by reason of maturity and different interests, graduate students have their own organizations. More than twenty-five such organizations center in academic Fields or groups of Fields; some are purely social, others informally academic. As an instance, one club founded in 1907, made up of over one hundred faculty and graduate student members interested in plant breeding and genetics, meets bimonthly for a dinner prepared by its members, after which the members hold an hour's

discussion on some topic outside those Fields, led by an invited visitor. Gamma Alpha is the only graduate fraternity which operates its own house, with facilities for both room and board; its membership is limited to students of physical and natural science—broadly interpreted. Other fraternities and sororities limited to graduate students and Faculty are in some instances social, in others academic or honorary. There are general organizations interested in politics, home life, art, etc. The graduate wives' club thrives; in addition to regular meetings for its more than one hundred members, interest groups meet separately.

Willard Straight Hall is the center of social life, both graduate and undergraduate. Supported by University fees included in the tuition and fees listed above, it supplies facilities for graduate groups and plans special functions for them. There is a graduate representative on the Board of Managers. The University maintains *Sage Chapel*, where nonsectarian services each Sunday are led by distinguished guest speakers. Graduate students are eligible for its trained choir.

Cornell's location in the Finger Lakes region of New York State stimulates outdoor activity. Agencies of the University operate an outdoor swimming pool, a golf course, a ski run with ski tow (twelve miles from the campus), riding classes, and other outdoor facilities. There are three large state parks within ten miles of the campus. Departments of the University plan field trips for various purposes, including ornithological, geological, agricultural, and industrial, which are open to interested graduate students.

RESOURCES FOR RESEARCH AND ADVANCED STUDY

The Graduate School does not conduct programs leading to advanced degrees in fields inadequately equipped for the purposes. Substantial collections and apparatus, in many instances unique, have been assembled for the use of graduate students; they are not described in this *Announcement*. The student allotment is designed to prevent emasculation of the pattern of individual instruction.

The descriptions below are limited to major general facilities at the service of graduate students in any or a variety of Fields of Instruction.

OFFICE OF VICE PRESIDENT FOR RESEARCH

Established to aid members of the Faculty in arranging for industrial and governmental sponsorship of cooperative research programs of interest and concern to Faculty and their students, this office advised and assisted in arranging research contracts in the University to the amount of eleven and a half millions of dollars during the year 1950-51. Excluding the work in Buffalo, 58 per cent was devoted to fundamental and 42 per cent to applied research. These contracts, covering all phases of human endeavor, ranging from 38.3 per cent in aeronautics (at the Cornell Aeronautical Laboratory) to 0.6 per cent in the humanities, are in addition to the University-supported departmental research which is a continuing commitment. This office works closely with the Graduate Faculty in supporting research programs which properly advance the education and training of graduate students.

RESEARCH CENTERS

SOCIAL SCIENCE RESEARCH CENTER

The *Social Science Research Center* is an organization designed to encourage and facilitate research in all major fields of the social sciences. Its services and facilities are available for social science research by individual Faculty members and graduate students in all schools and colleges of the University, as well as for use by organized staff groups. In addition to aid in the planning and development of studies and in voluntary co-operation of research workers, the Center supplies technical services by appropriate arrangement with the directors and staffs of specific projects. The two main objectives of the organization are to encourage basic research advances by means of technical and financial aids and to provide practical research training.

Projects currently sponsored or assisted by the Center deal with problems of interest to each social science discipline. A major theme of the present research program is the study of social change and of the impact of technology and economic change upon modern societies, both in the United States and in several foreign areas.

A number of opportunities for training through participation in studies sponsored by the Center are available to graduate students who qualify for research assistantships or special employment arrangements. Normally each study provides one or more opportunities of

this kind. Students participating in Center research register in the Graduate School and select major and minor subjects in accordance with the established procedures of the Graduate School. Arrangements for such research experience are made through the student's Special Committee in consultation with the directors of specific studies.

The Director of the Center is Professor Robin M. Williams, Jr., Morrill Hall.

HOUSING RESEARCH CENTER

The purpose of the *Housing Research Center* is to aid and guide basic research in the field of housing, to facilitate graduate study, and to route housing information among colleges and departments and between the University and sources of information off campus. A small central staff facilitates the initiation and conduct of projects.

The facilities of the Housing Research Center are available to Faculty members and graduate students in all Fields. Through the Center, students who cut across traditional lines of research may draw upon the knowledge and experience of specialists in such various subject areas as design, materials, equipment, structural methods, environment, family living, economics and finance, government, and health.

The Director of the Center is Professor Glenn H. Beyer, Martha Van Rensselaer Hall Annex.

CENTER FOR INTEGRATED AERIAL PHOTOGRAPHIC STUDIES

Photographic interpretation has applications in the fields of agriculture, engineering, geology, and city planning. The *Center for Integrated Aerial Photographic Studies* offers a broad program in various scientific fields for training personnel in aerial photographic interpretation. The objectives are, first, to train scientists who will be able to use aerial photographs for surveys and planning in fields where they are needed and, second, through research to extend the use of aerial photographs into all fields which can be benefited.

The Center comprises a staff of educators, scientists, and technicians experienced in research and the application of aerial photographs to their respective fields. The program consists of primary courses in engineering interpretation of aerial photographs, map reproduction, photogrammetry, cartography and map projections, together with specialized study in a particular field of the candidate's choice, such

as agricultural development, national resource explorations, city planning, or engineering project planning.

For information about the Center, write to the Director, Center for Integrated Aerial Photographic Studies, Lincoln Hall.

NEW YORK STATE AGRICULTURAL EXPERIMENT STATION AT GENEVA

Since July 1, 1923, the *New York State Agricultural Experiment Station at Geneva* has been under the administration of Cornell University. Research workers on its staff are eligible for membership on the Faculty of the Graduate School, and its facilities for research are available to graduate students.

The Station is equipped to care for graduate students in certain specific lines of research, viz., bacteriology, chemistry, economic entomology, plant pathology, pomology, seed investigations, and vegetable crops. Ample accommodations are available from the standpoint of laboratory facilities, reference library, etc., for research in the laboratory sciences. Greenhouses and a farm of approximately 500 acres are available for work with fruits and vegetables.

Certain phases of the investigations now being conducted at the Station and other problems for which the facilities of the Station are suitable may be used as thesis problems by graduate students.

The Director is Professor A. J. Heinicke, Plant Science Building, Cornell University, Ithaca.

Students who plan to do part of their graduate work at Geneva should correspond with the Dean of the Graduate School concerning regulations as to residence, Special Committees, etc.

CORNELL AERONAUTICAL LABORATORY

The *Cornell Aeronautical Laboratory* is a separate corporation, wholly owned by Cornell University, located in Buffalo, New York. Applied and fundamental research in the aeronautical sciences is conducted in this very completely equipped laboratory under contracts with the Military Services. Quite close relationships, both research and educational, are maintained with the campus in Ithaca.

OTHER RESEARCH UNITS

Some other research units allied with the University, either as wholly owned and operated divisions or as wholly or partially auto-

mous organizations with whom the University has a working agreement, are the Sloan-Kettering Cancer Research Institute (in New York City, through the Graduate School of Medical Sciences), the Veterinary Virus Research Institute (at Ithaca), and the Brookhaven National Laboratory (Cornell is one of nine university trustees, under contract with the Atomic Energy Commission).

THE UNIVERSITY LIBRARIES

The University libraries comprise the General Library, Departmental and Seminary Libraries, the Libraries of the Colleges of Agriculture, Engineering, Home Economics, Industrial and Labor Relations, Law, Medicine, and Veterinary Medicine, and special libraries like the Barnes Hall Library (religion), the Goldwin Smith Library (humanities), and the Library of the Cornell Aeronautical Laboratory. The total current holdings are about a million and a half items. There are also over four million separate manuscript items in the Regional History Collection. The most recent addition to the physical facilities is the Albert R. Mann Library of Agriculture and Home Economics, which will open for use in 1952. Cubicles and other study spaces are available for the use of graduate students in the several libraries.

Especially enriched by the early acquisitions of Cornell's first president, Andrew D. White, and by the first librarian, Willard Fiske, the libraries possess special collections of rare books and manuscripts in many of the Fields of graduate study, including unique collections relating to the French Revolution, witchcraft, Dante, Petrarch, China and the orient (Wason), Iceland, American historical documents (Noyes), Brazil, and German literature and philology (Zarncke). A separate rare-book section with a special curatorship has just been established. The acquisitions staffs work with graduate students to procure volumes needed for their special studies.

PUBLICATION AND PHOTOGRAPHY

Cornell University Press is the oldest university press in America and is among the leaders in number of volumes published annually. In addition to serving scholars and scientists of the University by publication of results of studies, the staff of the Press, in co-operation with the Graduate School, conducts colloquia on methods and problems of publishing, directed specifically to graduate students. The Press

publishes series of scholarly monographs in certain Fields.

The extension services of the New York State Colleges, which form integral parts of the University, disseminate knowledge through an intensive program of publication, photography, and recording, supervised by professional staffs. Materials of graduate students may find an outlet through these channels.

The University owns and operates the Photographic Science Laboratory, which is equipped to create or co-operate in the creation of photographic studies and visual aids of all kinds.

FACILITIES FOR VISITING SCHOLARS

Whenever possible, the Faculty welcomes mature scholars who wish to use the facilities of the University to prosecute investigations or to work with the Faculty in the advancement of knowledge. A scientist or scholar who wishes to work on the campus, especially if he expects to use laboratories or libraries, should write in advance to any member of the Graduate Faculty whom he knows or who is acquainted with his work. Since anyone regularly engaged on the campus is registered, the Graduate Faculty has arranged for two types of appointment for visiting scholars.

Resident Doctors. The Graduate Faculty, on the nomination of any of its members, may admit as a Resident Doctor any mature scholar who holds the Doctor's degree or who has equivalent standing. On the recommendation of the Dean, Resident Doctors are exempt from payment of tuition and all fees except laboratory materials charges. Ordinarily they are not permitted to attend classes.

Honorary Fellows. Holders of the Doctor's degree or other persons of recognized standing as scholars, who wish to continue work in a field in which they have already achieved distinction, may, in the discretion of the Graduate Faculty, be appointed to honorary fellowships. These fellowships cover all fees except the laboratory and library fee. Actual residence at the University and regular registration in the Graduate School are required of incumbents.

FIELDS OF INSTRUCTION

THE FACULTIES, approved major and minor subjects, special requirements, and programs in fulfillment of the requirements for the general degrees of M.A., M.S., and Ph.D. are described in the following pages. The separate Fields, which are listed in the Index, are arranged for convenient reference under the following four headings: Fine Arts, Languages and Literatures, Philosophy; History and Social Sciences; Biological and Agricultural Sciences; Physical Sciences and Mathematics. These headings do not represent any educational or administrative divisions and should not be confused with the Groups listed on p. 2.

Fields. In most instances the Field coincides with a department in a college or school. In parentheses immediately following the name of the Field is given an abbreviation indicating the *Announcement* of a school or college which contains descriptions of courses and seminars offered, as follows: *Ag.*, New York State College of Agriculture; *Arch.*, College of Architecture; *Arts*, College of Arts and Sciences; *Ed.*, School of Education; *Engin.*, College of Engineering; *H.E.*, New York State College of Home Economics; *Hotel*, School of Hotel Administration; *I.L.R.*, New York State School of Industrial and Labor Relations; *Vet.*, New York State Veterinary College. For registration and preregistration of courses, see above, p. 11.

Major and Minor Subjects. For each Field there is given an approved list of titles from which candidates for advanced general degrees choose major and minor subjects. The numbers 1, 2, 3, 4, 5 have the following meaning:

- 1, approved as major subject for the Ph.D.
- 2, approved as major subject for the Master's degree.
- 3, approved as minor subject when the major is in the same Field.
- 4, approved as minor subject when the major is in another Field.
- 5, approved as a minor subject for the Master's degree only.

For explanation regarding *language requirements* for the Master's degree, see above, p. 10.

Representatives. Since instruction in the Graduate School is primarily

individual, those interested in becoming students are encouraged to communicate as fully as is desirable with individual members of the Faculty with whom they may want to study. Personal interviews in advance of formal application for admission are especially encouraged. For the benefit of those who are not acquainted with appropriate members in the Field or Fields of their choice, each Field has selected a Representative to whom inquiries may be addressed. These Representatives are designated in the lists of Faculty below by *italics*.

FINE ARTS, LITERATURES, PHILOSOPHY

HISTORY OF ART AND ARCHAEOLOGY (*ARTS*)

Professors D. L. FINLAYSON, N. A. PATILLO, F. O. Waagé.

APPROVED MAJOR AND MINOR SUBJECTS

Archaeology 2, 3, 4

History of Art 2, 3, 4

Language requirement for Master's degree, proficiency in one: French, German, Italian.

Graduate work is offered in the general field of the history of the visual arts (architecture, painting, sculpture, and the minor arts). To elect this as a major subject the candidate must present undergraduate preparation comparable to the major course in fine arts, option 2 (visual arts course) in the College of Arts and Sciences at Cornell. Instruction is offered through advanced undergraduate courses and through independent study and research under individual direction.

The same conditions will usually apply in the election of work in the general field of archaeology as a major subject; however, in undergraduate preparation, relevant courses in such subjects as cultural anthropology may be substituted for some of those in art history, and for graduate work in classical archaeology courses in Latin and Greek may be so substituted.

CITY AND REGIONAL PLANNING (*ARCH.*)

Professors F. W. EDMONDSON, T. W. Mackesey, J. W. REPS.

APPROVED MAJOR AND MINOR SUBJECTS

City Planning 1, 3, 4

Regional Planning 1, 3, 4

Major study for candidates for the degree of Ph.D. is limited to those who hold the degree of Master of Regional Planning or its equivalent.

THE CLASSICS (*ARTS*)

Professors HARRY CAPLAN, JAMES HUTTON, G. M. Kirkwood, FRIEDRICH SOLMSEN, F. O. WAAGE.

APPROVED MAJOR AND MINOR SUBJECTS

Latin Language and Literature 1, 2	Greek Language and Literature 1, 2
Latin Literature 2, 3, 4	Greek Literature 2, 3, 4
Latin Language 3, 4	Greek Language, 3, 4
Vulgar Latin 3, 4	Comparative Indo-European
Medieval and Renaissance Latin	Linguistics 1, 3, 4
Literature 1, 2, 3, 4	Classical Archaeology 1, 2, 3, 4
Classical Rhetoric (in translation)	
3, 4	

Language requirement for Master's degree, proficiency in one: French, German.

Admission to graduate study in a subject included in the field of the classics, except in archaeology, assumes a knowledge of the field selected equivalent in general to that expected of a student who has pursued the subject concerned throughout four years of undergraduate study in a college of recognized standing.

Graduate work in the classics is conducted in the main by the seminar system, the object of which is training in the methods, the principles, and the performance of independent research and criticism, and the work is therefore as far as possible put into the hands of the students themselves. Subjects additional to those investigated in the seminar courses are ordinarily treated in courses of lectures. A seminar room in the University Library building is reserved for the exclusive use of graduate students in the classics.

For fellowships in Greek and Latin, see page 22. The income of the Charles Edwin Bennett Fund for Research in the Classical Languages is used each year in the way best suited to promote the object for which the fund was established.

Doctoral dissertations of an appropriate nature will be accepted for publication in the *Cornell Studies in Classical Philology*.

ENGLISH LANGUAGE AND LITERATURE (ARTS)

Professors M. H. ABRAMS, R. M. ADAMS, R. C. BALD, J. W. BICKNELL, G. F. CRONKHITE, R. H. ELIAS, *W. H. French*, B. HATHAWAY, G. H. HEALEY, C. W. JONES, W. R. KEAST, J. G. LINN, F. E. MINEKA, A. M. MIZENER, H. A. MYERS, D. NOVARR, E. B. PARTRIDGE, W. M. SALE, R. J. SCHOECK, J. A. SESSIONS, H. W. THOMPSON.

APPROVED MAJOR AND MINOR SUBJECTS

Medieval Literature 1, 2, 3, 4	American Literature 1, 2, 3, 4
Old and Middle English 1, 2, 3, 4	English Poetry 1, 2, 3, 4
The English Renaissance to 1660	Dramatic Literature 1, 2, 3, 4
1, 2, 3, 4	Prose Fiction 1, 2, 3, 4
The Restoration and the Eighteenth	Folk-Literature 3, 4
Century 1, 2, 3, 4	Creative Writing 2, 3
The Nineteenth Century and After	
1, 2, 3, 4	

Language requirement for Master's degree, proficiency in one: Greek, Latin, French, German, Italian.

In general, thirty-six hours of college English will be required of all applicants; but college work of good quality in allied literatures may be counted against a shortage. Training in the Greek and Latin languages and literatures is especially acceptable.

All applicants should include among their papers the results of the Graduate Record Examination (Aptitude, Profile, and Advanced Tests). See page 5.

Those who wish advice regarding choice of subject or a proper director for the work they have in mind may write to the Department of English, Goldwin Smith Hall.

Applicants for the doctorate will be admitted as noncandidates, under supervision of the chairman of the Department. They must take a candidacy examination given by the staff within the first month of residence and, if successful, will be transferred to candidacy as of the first of the term. But those admitted at or very near the beginning of the term may be allowed, upon the decision of the chairman of the Department, to defer the examination for one term, and may recover the lost residence unit upon the recommendation of their Special Committees. All applicants may secure from the Department of English copies of a reading list upon which questions will be based.

For the Master's degree there are no special requirements in courses or subjects. Before receiving the Doctor's degree, candidates must demonstrate a knowledge of Old English, both language and literature. In all other matters of schedule, the candidate's Special Committee is the final authority and will help him select a profitable course.

During the period from July to September, members of the staff will not ordinarily advise candidates or supervise Summer Research.

In addition to the fellowships described above, the department awards part-time teaching positions to some candidates for advanced degrees.

GERMAN STUDIES (ARTS)

Professors E. KAHLER, V. Lange, W. G. MOULTON, W. F. OECHLER.

APPROVED MAJOR AND MINOR SUBJECTS

German Literature 1, 2, 3, 4

Germanic Linguistics 1, 2, 3, 4

In the advanced courses in this field the work is twofold: literary and linguistic. The history of German literature from the earliest period to the present day is treated in lecture courses with collateral reading. Special topics are selected for detailed study, such as the epic and lyric poetry of the Middle High German period, the literature of the Baroque period, the age of Goethe, the drama of the nineteenth century, and contemporary literature. The courses offered in linguistics include the study of Gothic and of Old and Middle High German; they also afford an introduction to the historical and descriptive methods of language study. The seminar in German literature aims to impart the principles and methods of investigation.

Candidates for the Ph.D. with a major in German literature must select Germanic linguistics as one of their minors; candidates for the Ph.D. with a major in Germanic linguistics must select German literature as one of their minors. Candidates for advanced degrees in German studies are expected to have an adequate knowledge of French and Latin.

MUSIC (ARTS)

Professors W. W. Austin, D. J. GROUT, R. L. HULL, R. M. PALMER.

APPROVED MAJOR AND MINOR SUBJECTS

History of Music 2, 3, 4

Musicology 1, 2, 3, 4

Musical Composition 2, 3, 4

Theory of Music 2, 3, 4

Language requirement for Master's degree: for majors in the history of music or musicology, proficiency in French and German; for majors in composition or theory, proficiency in French or German.

Candidates are expected to take active interest in some sort or sorts of musical performance. All candidates are tested for musical proficiencies: singing and playing unfamiliar music at sight, score reading, and fluency at the keyboard; on the basis of these tests, students may be advised to enroll in undergraduate courses or to undertake extracurricular work in musical practice and theory. Choral and orchestral organizations of the University and the community welcome graduate students and their wives or husbands as members.

Professor Palmer, in addition to his courses and a seminar, serves as chairman of the Special Committees of graduate student composers and theorists. With the help of the department he provides opportunities for them to hear their works performed—the best of them at public concerts. Professors Hunter Johnson and John Kirkpatrick, although not ordinarily members of Special Committees, are also constantly concerned with graduate work in composition.

Professor Grout is chairman of the Special Committees of musicologists. From 1948 to 1951 the Music Building was the editorial office of the *Journal of the American Musicological Society*. A unique microfilm collection of Renaissance music and musical theory provides materials for the research of several graduate students.

Normally students whose major subject is theory or composition choose history or musicology as a minor subject, and vice versa. Doctoral candidates choose a second minor subject in a related field.

SUSAN LINN SAGE

SCHOOL OF PHILOSOPHY (ARTS)

Professors MAX BLACK, S. M. BROWN, JR., E. A. BURTT, NORMAN MALCOLM, A. E. MURPHY, H. R. SMART, and *Gregory Vlastos*.

The Susan Linn Sage School of Philosophy was founded through the generosity of the late Henry W. Sage, who endowed the Susan Linn Sage Professorship and gave in addition \$200,000 to provide permanently for instruction and research in philosophy.

The Philosophical Review, supported by the University and issued under the auspices of the Sage School, is a quarterly journal devoted to the interests of philosophy, including logic, metaphysics, ethics, aesthetics, the history of philosophy, and the philosophy of religion. By the terms of its establishment, *The Review* is an absolutely free organ of philosophical scholarship, not devoted to the propagation of any doctrine.

APPROVED MAJOR AND MINOR SUBJECTS

Aesthetics 1, 2, 3, 4

Metaphysics 1, 2, 3, 4

Epistemology 1, 2, 3, 4

Philosophy 4

Ethics 1, 2, 3, 4

Philosophy of Religion 1, 2, 3, 4

History of Philosophy 1, 2, 3, 4

Political Philosophy 1, 2, 3, 4

Logic 1, 2, 3, 4

The instruction offered to graduate students presupposes such undergraduate courses in the subject as would be taken by a student in the College of Arts and Sciences of Cornell University who had elected philosophy as a major subject. Those who have not had equivalent preparation are expected to make up their deficiencies outside the work required for an advanced degree.

The Sage School provides opportunity for advanced study to two classes of graduate students: (1) those whose chief branch of research is in allied fields but who desire to supplement this with a minor in philosophy; (2) those whose major interest is in some branch of philosophy.

1. Graduate students having a major interest in literature or the arts, in history or social studies, or in mathematics or a branch of experimental science, are permitted to choose a minor in philosophy with such emphasis as best suits their needs. For such students the School endeavors to outline a plan of philosophical study (in courses or directed reading) which will form a natural supplement to their field of research.

2. Students whose major interest is in philosophy are required (a) to gain a general knowledge of the whole subject including its history, and (b) to select some aspect or subdivision of it for intensive study and research.

ROMANCE STUDIES (ARTS)

Professors F. B. AGARD, M. G. BISHOP, J. COLLIGNON, G. I. Dale, R. A. HALL, JR., and B. L. RIDEOUT.

APPROVED MAJOR AND MINOR SUBJECTS

French Linguistics 1, 2, 3, 4

Romance Linguistics 1, 2, 3, 4

French Literature 1, 2, 3, 4

Spanish Linguistics 1, 2, 3, 4

Italian 1, 2, 4

Spanish Literature 1, 2, 3, 4

A working knowledge of Latin is especially desirable for all candidates for advanced degrees in this field. All candidates for the degree of Doctor of Philosophy must satisfy the language requirement in French and German before beginning to earn the fourth residence unit. A graduate student in Romance Studies should have completed some formal course of study in the language and literature of the language which he intends to select as his major subject and should have adequate preparation for advanced work in his minor subjects.

RUSSIAN STUDIES (ARTS)

Professors G. H. Fairbanks (Linguistics), Vladimir Nabokov (Literature).

APPROVED MAJOR AND MINOR SUBJECTS

Russian Literature 1, 2, 3, 4

Slavic Linguistics 1, 2, 3, 4

SPEECH AND DRAMA (ARTS)

Professors H. D. Albright, C. C. ARNOLD, HARRY CAPLAN, W. H. STANTON, H. A. WICHELS.

APPROVED MAJOR AND MINOR SUBJECTS

*Division of Rhetoric and Public**Speaking:*

Rhetoric and Public Speaking

1, 2, 4

Principles of Public Address 3, 4

History of Public Address 3, 4

Classical Rhetoric 3, 4

Medieval Rhetoric 3, 4

Division of Dramatic Production:

Drama and the Theatre 1

Dramatic Production 2, 3, 4

Playwriting 2, 3, 4

Theatre Techniques 3, 4

Division of Phonetics:

Speech and Phonetics 2, 3, 4

The chief aim of graduate work in rhetoric and public speaking and in dramatic production is to develop competent investigators and teachers for colleges and universities. In many cases, the work will require more than the minimum periods of residence. Ordinarily, residence in this University during at least two academic years will be necessary for the doctorate.

A requirement for major candidates in speech and phonetics is training in a foreign language equivalent to three college entrance units, or in two foreign languages equivalent to two college entrance units in each.

Candidates for the Doctor's degree whose major interest is in rhetoric, that is, in the principles, history, and criticism of public address, will usually choose one minor subject from the field of literary history and criticism or from that of the social sciences.

Candidates for the Doctor's degree whose major interest is in drama and the theatre will be required to take dramatic literature as a minor subject, unless they have already pursued systematic study in dramatic literature, and such candidates must expect to be in residence two years and one summer beyond the requirements for the Master's degree. If preparing for general teaching, candidates will be advised to take additional courses in public speaking and speech training.

Candidates for the Master's degree in dramatic production will require at least one academic year and one summer session of residence.

Students in the Division of Dramatic Production will be expected to avail themselves of the opportunities for theatre practice afforded by various branches of THE CORNELL UNIVERSITY THEATRE.

HISTORY AND SOCIAL SCIENCES

AGRICULTURAL ECONOMICS (AG.)

Professors M. C. BOND, C. A. BRATTON, MAX E. BRUNK, H. E. Conklin, L. C. CUNNINGHAM, L. B. DARRAH, HERRELL DEGRAFF, WENDELL EARLE, V. P. HART, G. W. HEDLUND, F. F. HILL, T. N. HURD, C. D. KEARL, M. S. KENDRICK, E. A. LUTZ, E. G. MISNER, F. A. PEARSON, M. P. RASMUSSEN, K. L. ROBINSON, G. P. SCOVILLE, LELAND SPENCER, S. W. WARREN.

APPROVED MAJOR AND MINOR SUBJECTS

Economics of Agriculture 1, 2, 3, 4

Agricultural Business Management

1, 2, 3, 4

Farm Management 1, 2, 3, 4

Marketing 1, 2, 3, 4

Prices and Statistics 1, 2, 3, 4

Public Administration and Finance 1, 2, 3, 4

Candidates for the Doctor's degree who select a major from the above list may also select a minor from this list but should choose the second minor from among those offered elsewhere in the University.

As a designated major or minor subject in the above list of majors and minors, economics of agriculture represents agricultural policy, farm finance, land economics, food economics, and agricultural geography. These subject matter areas, commonly identified separately, actually require, for satisfactory mastery, a broad acquaintance with the economics of agriculture as an industry. The other majors and minors listed above represent more specialized subdivisions of the field of agricultural economics.

A broad knowledge of the physical and biological aspects of agriculture is valuable background for graduate work in the field of agricultural economics. Undergraduate training should include the basic sciences and a number of agricultural production and processing courses. (An undergraduate major in agricultural economics is not necessary for graduate work in this field.) First-hand experience in farming also is highly valuable and is prerequisite to the attainment of proficiency in some of the specialized branches of the field.

CHILD DEVELOPMENT AND FAMILY RELATIONSHIPS (H.E.)

*Professors M. L. BARRETT, U. BRONFENBRENNER, R. H. DALTON, P. DEMPSEY,
E. C. DEVEREUX, JR., H. FELDMAN, M. E. Ford, L. D. ROCKWOOD, K. M.
REEVES, R. C. SMART, E. B. WARING.*

APPROVED MAJOR AND MINOR SUBJECTS

Child Development and Family

Child Development 3, 4

Relationships 1, 2, 3, 4

Family Relationships 3, 4

As a basis for graduate work some training in the social sciences or related disciplines is desirable. As a background for advanced work some experience in one of the following areas is also desirable: teaching or other experiences with children, adolescents, or adults; social or clinical work; or extension teaching or administration. However, admission to graduate work is based primarily on evidence of the student's competency to do advanced work and on broad preparation as a basis for specialization. Opportunities to acquire background in the social sciences are available, and the graduate student with relatively little preparation in the social sciences should plan on additional time for the completion of his degree.

Laboratory experience is provided in the Department nursery school, in public nursery schools, in play groups in settlement houses, and in other organized groups with school-age children. Insofar as facilities are available, graduate students are helped to find ways to put their knowledge into practice.

The department has currently two major research projects in which students may participate for the purposes of training and research. One project is a long-range interdisciplinary series of researches in social growth. The other project is concerned with child-rearing practices.

Several teaching and research assistantships are available. These are usually awarded to advanced graduate students. Application should be made directly to the Department of Child Development and Family Relationships.

Since the subject matter in child development and family relationships requires an interdisciplinary approach, students are encouraged to supplement their work in the department with study in related areas. For related courses,

see the departments in the *Announcements* indicated: Departments of Psychology and Sociology and Anthropology (*Arts*); Departments of Rural Education and Rural Sociology (*Ag.*); School of Education (*Ed.*); and School of Industrial and Labor Relations (*I.L.R.*).

ECONOMICS (*ARTS*)

Professors G. P. Adams, Jr., M. A. COPELAND, M. G. DE CHAZEAU, J. G. B. HUTCHINS, A. E. KAHN, M. S. KENDRICK, R. E. MONTGOMERY, CHANDLER MORSE, J. E. MORTON, P. M. O'LEARY, H. L. REED, E. P. REUBENS.

APPROVED MAJOR AND MINOR SUBJECTS

Economic History 1, 2, 3, 4

Economic Theory and Its History 1, 2, 3, 4

Industrial Organization, Control and Finance 1, 2, 3, 4

International Economics 1, 2, 3, 4

Labor Economics 1, 2, 3, 4

Monetary Economics and Fiscal Policy 1, 2, 3, 4

Public Finance 1, 2, 3, 4

Economic Statistics 1, 2, 3, 4

Trade Fluctuations and the Determination of Output and Income 1, 2, 3, 4

Language requirement for Master's degree: college entrance language.

1. All candidates for the degree of Ph.D. with major in economics will be required to demonstrate competence in at least three subsidiary fields selected from the list of approved major and minor subjects in addition to their chosen major and minor subjects. One of these subjects must be economic theory and its history unless that is selected as a major or minor subject.

2. All candidates for advanced degrees who elect a minor in economics will be held for work in economic theory.

3. Candidates for advanced degrees with major in economics may elect one minor subject from another field, or may, with the approval of their Special Committees, substitute subjects outside economics for one or two of those listed above.

4. Applications for fellowships and scholarships in economics should be filed with the Dean of the Graduate School prior to March 1. Applications for teaching fellowships, however, should be made directly to the chairman of the Department of Economics.

ECONOMICS OF THE HOUSEHOLD AND HOUSEHOLD MANAGEMENT (*H.E.*)

Professors E. C. BRATTON, H. CANON, E. M. CUSHMAN, M. K. HEINER, M. A. ROLLINS, J. WARREN, L. J. WILLIAMSON.

APPROVED MAJOR AND MINOR SUBJECTS

Economics of the Household and Household Management 1, 2, 4

Economics of the Household 2, 3, 4 Household Management 2, 3, 4

Students selecting a major in economics of the household and household management are expected to take courses in both phases of the field; for the degree of Ph.D. the minor subjects are usually selected to support one phase or the other. Appropriate minor subjects may be chosen from a variety of fields including other branches of home economics, as well as agricultural economics, economics, education, psychology, sociology.

As a background for graduate work in this field, a well-rounded undergraduate program in home economics is preferable, in general, to specialization. Undergraduate courses in mathematics, statistics, economics, history, sociology, psychology, physics, chemistry, physiology, and bacteriology are also useful.

EDUCATION AND RURAL EDUCATION (ED.)

Professors J. S. AHMANN, C. K. BEACH, SARA BLACKWELL, J. M. BROPHY, CAROLINE CRAWFORD, R. H. DALTON, T. E. ECKERT, L. H. ELLIOTT, L. A. EMERSON, JEAN FAILING, F. S. FREEMAN, M. D. GLOCK, EVA GORDON, HELEN HOEFER, E. R. HOSKINS, MARGARET HUTCHINS, W. R. KUNSELA, J. P. LEAGANS, C. B. MOORE, HELEN MOSER, A. G. NELSON, E. L. PALMER, IRENE PATTERSON, W. A. SMITH, F. H. STUTZ, ETHEL WARING, A. L. Winsor; Deans LUCILE ALLEN and FRANK BALDWIN.

APPROVED MAJOR AND MINOR SUBJECTS

Agricultural Education 1, 2, 3, 4	History of Education 2, 3, 4
Curriculum 1, 2, 3, 4	Home Economics Education 1, 2, 3, 4
Education 3, 4	Industrial Education 1, 2, 3, 4
Educational Administration 1, 2, 3, 4	Nature Study 1, 2, 3, 4
	Rural Education 1, 3, 4
Educational and Mental Measurement 2, 3, 4	Science Education 1, 2, 3, 4
	Secondary Education 1, 2, 3, 4
Educational Psychology 1, 2, 3, 4	Social Studies Education 1, 2, 3, 4
Extension Education 1, 2, 3, 4	Supervision 1, 2, 3, 4
Guidance and Personnel Administration 1, 2, 3, 4	Theory and Philosophy of Education 1, 2, 3, 4

Students in education may be admitted to candidacy for two types of advanced degrees: (1) the general degrees, M.A., M.S., or Ph.D., or (2) the professional degrees, M.Ed., or Ed.D. Requirements for (2) and a listing and description of courses in this field are to be found in the *Announcement of the School of Education*.

The requirements for admission to candidacy for the general degrees are the same as those for the professional degrees. In the field of education there is no foreign language requirement for Masters' degrees unless stipulated by the candidate's Special Committee.

FAR EASTERN STUDIES (ARTS)

Professors KNIGHT BIGGERSTAFF, J. F. CADY, L. M. HANKS, C. F. HOCKETT, G. McT. KAHIN, M. E. OPLER, N. A. PATILLO, E. P. REUBENS, H. E. Shadick, LAURISTON SHARP.

APPROVED MAJOR AND MINOR SUBJECTS

Chinese Literature 1, 2, 3, 4

Far Eastern Studies 3, 4

Requirements for the Doctor's degree with a major in Chinese literature: (1) familiarity with representative works in classical and vernacular Chinese; (2) broad knowledge of the available translations of Chinese literature and critical studies in Western languages; (3) specialized knowledge of at least two sub-fields such as the Confucian or Taoist classics, poetry, drama, fiction, classical prose, or twentieth-century writings.

The requirements for the M.A. degree or for a minor in Chinese literature are roughly equivalent to (1) and (2) above.

The requirements for the minor in Far Eastern Studies include a thorough factual knowledge of China or Southeast Asia and a general acquaintance with all the countries in the Far East and with their relations.

The Wason Collection is a unique European-language library on China and the Chinese. The European-language library on Southeast Asia also excels. The Chinese-language materials, amounting to some fifty thousand volumes, are particularly strong in bibliography, literature, modern history, and the various aspects of contemporary Chinese civilization.

The department administers special graduate area programs on China and Southeast Asia.

Graduate students in the China program may major in Chinese history (see History and the Social Sciences) or in Chinese literature; or they may major in another department with a minor in Far Eastern Studies or Chinese history.

Graduate students in the Southeast Asia program may major in any discipline, with a minor in Far Eastern Studies. A number of fellowships are available to students in this program. See Fellowships and Scholarships, p. 00.

Several assistantships are also available. Application should be made directly to the Department of Far Eastern Studies for assistantships.

For a full description of these programs see the *Announcement of the Department of Far Eastern Studies*, to be obtained on application to the Department of Far Eastern Studies, Morrill Hall.

GENERAL LINGUISTICS (ARTS)

Professors F. B. AGARD, J. M. Cowan, G. I. DALE, G. H. FAIRBANKS, W. H. FRENCH, R. A. HALL, JR., C. F. HOCKETT, W. G. MOULTON, C. K. THOMAS.

APPROVED MAJOR AND MINOR SUBJECTS

General Linguistics 1, 2, 3, 4

The following more specialized linguistic fields, listed elsewhere, are also available: Latin language, Greek language (see the Classics); Old and Middle English (see English Language and Literature); Germanic linguistics (see German Studies); French, Spanish, and Romance linguistics (see Romance Studies); and Slavic Linguistics (see Russian Studies). In any of these, emphasis is laid on (1) methodology, and (2) the body of results already attained in the field; but in general linguistics the primary emphasis is on (1), in the linguistics of a specified language or group of languages the primary emphasis is on (2).

A student majoring in general linguistics as candidate for the Ph.D. must choose cultural anthropology as one of his minors.

The Cornell Linguistics Club, open to all interested, meets biweekly throughout the school year and affords an opportunity for the presentation and discussion of current developments of topics of research.

GOVERNMENT (ARTS)

Professors H. W. BRIGGS, R. E. CUSHMAN, A. T. DOTSON, *Mario Einaudi*, G. McT. KAHN, C. L. ROSSITER.

APPROVED MAJOR AND MINOR SUBJECTS

American Government and Institutions 1, 2, 3, 4	International Law and International Organization 1, 2, 3, 4
Comparative European Government 1, 2, 3, 4	Political Theory 1, 2, 3, 4
Constitutional Law 1, 2, 3, 4	Public Administration 1, 2, 3, 4

For graduate work in government a candidate should have a general knowledge of political science, history, economics, and international affairs. It is recommended that candidates for the Ph.D. with major study in government should take at least one minor outside the field.

In addition to the qualifying and final examinations, candidates for the Ph.D. with a major in government will be required to pass a comprehensive examination, oral and written, prior to the completion of four terms of residence and before commencing work on the thesis. This examination shall comprise American government and institutions, political theory, and three additional subjects to be selected by the candidate either (1) from the approved major and minor subjects listed by the Field; or (2) where minor subjects are taken outside the Field, from such minors as may be required by the professor in charge.

The attention of students desiring to do graduate work in public law is directed to opportunities open to them in the Law School. Members of the Faculty of the Law School may serve as members of Special Committees where appropriate arrangements have been made.

HISTORY (ARTS)

Professors KNIGHT BIGGERSTAFF, E. W. FOX, P. W. *Gates*, HENRY GUERLAC, M. L. W. LAISTNER, F. G. MARCHAM, C. P. NETTELS, CARL STEPHENSON, MARC SZEFTTEL.

APPROVED MAJOR AND MINOR SUBJECTS

American History 1, 2, 3, 4	History of Science 1, 2, 3, 4
Ancient History 1, 2, 3, 4	Medieval History 1, 2, 3, 4
Chinese History 1, 2, 3, 4	Modern European History 1, 2, 3, 4
English History 1, 2, 3, 4	Slavic History 1, 2, 3, 4

For graduate work in history a student should have a general knowledge of history, government, and other social studies. He should be able to read French, German, and any other foreign language required for work in his special field. For major work in ancient history he needs a reading knowledge of both Greek and Latin; for major work in medieval history a reading knowledge of Latin; for major work in Chinese history a reading knowledge of Chinese; for major work in Slavic history, a reading knowledge of Russian. Such linguistic training should preferably be obtained by the student during his undergraduate years, but deficiencies can be made up after admission to the Graduate School. Candidates taking major work in history may take minors in history or in other Fields, such as government, economics, sociology, philosophy, literature, or industrial and labor relations.

Several assistantships are available. Prospective students interested in applying for such should write directly to the Department of History, Boardman Hall.

HOME ECONOMICS, GENERAL (H.E.)

Professors: See Child Development and Family Relationships, Economics of the Household and Household Management, Food and Nutrition, Home Economics Education, Housing and Design, Institution Management, Textiles and Clothing.

APPROVED MAJOR AND MINOR SUBJECTS

General Home Economics 5

For students who wish the minor to give breadth of contact with the field of home economics rather than depth in one area. Courses to be selected from the offerings in several of the areas of home economics.

HOME ECONOMICS EDUCATION (H.E., ED.)

Professors S. Blackwell, C. CRAWFORD, H. HOEFER, M. HUTCHINS, H. MOSER, I. PATTERSON.

APPROVED MAJOR AND MINOR SUBJECTS

Home Economics Education 1, 2, 3, 4

The types of advanced degrees for which graduate students majoring in home economics education may become candidates are: (1) Master of Science; (2) Master of Education; (3) Doctor of Philosophy; (4) Doctor of Education. For (2) and (4) see the *Announcement of the School of Education*.

A candidate for an advanced degree with a major or minor in home economics education is expected to have an undergraduate major in home economics and some courses in education. Experience in teaching children and adults is desirable as a basis for graduate work and may be accepted in some cases in lieu of undergraduate courses.

Graduate students may prepare for some specialized phase of home economics education, such as adult education, extension teaching, secondary school teaching, college teaching, administration and supervision of home economics programs, and research in home economics education. Opportunities are available for students to observe and participate in home economics programs at all grade and age levels through the schools, the extension service, and other agencies. Those who wish to do so may participate in the research program of the Home Economics Education Department which is focused on appraising high school home economics programs. The current emphasis in this research is in the areas of child development and family relationships.

All candidates for advanced degrees in home economics education are expected to acquire (1) a general knowledge of the history and philosophies of education; a doctoral candidate with a major in home economics education should also develop: (2) a thorough understanding of the principles of curriculum development, educational psychology, teaching methods, and evaluation; and their application to homemaking education; and (3) an understanding of research methods in education.

A doctoral candidate with a minor in home economics should have, in addition to a general knowledge of history and philosophy of education, some understanding of the principles of curriculum development, educational psychology, teaching methods, and evaluation.

A Master's candidate with a major in home economics education should have, in addition to a general knowledge of history and philosophy of education, some understanding of the principles of curriculum development, educational psychology, teaching methods, and evaluation.

HOTEL ADMINISTRATION (*HOTEL*)

Professors J. H. BARRETT, C. E. CLADEL, J. COURTNEY, G. W. LATTIN, H. B. MEEK, F. H. RANDOLPH, H. J. RECKNAGEL, C. I. SAYLES, T. W. SILK, L. TOTH.

APPROVED MAJOR AND MINOR SUBJECTS

Hotel Administration 1, 2, 4

Hotel Accounting 2, 3, 4

Graduate work in the field of hotel administration is open to those who have completed in full the requirements for the undergraduate degree in the School of Hotel Administration and to them only.

Students who hold Bachelors' degrees in the liberal arts or in general business administration who wish a program in hotel administration normally enroll in the undergraduate division. They may become candidates for an additional Bachelor's degree or at their choice simply enroll for a specialized program of hotel administration courses suited to their particular needs.

HOUSING AND DESIGN (*H.E.*)

Professors G. H. BEYER, H. J. CADY, D. W. ERWAY, J. E. MONTGOMERY, S. NEBLETT, C. STRAIGHT, V. TRUE, M. WILKERSON.

APPROVED MAJOR AND MINOR SUBJECT

Housing and Design 1, 2, 3, 4

Language requirement for Master's degree: college entrance language.

For the degree of M.S. with a major in housing and design the work may be focused in housing (including only the nontechnical or "social" aspects) or in design. Acceptable background preparation for students who choose the housing focus includes the general areas of sociology or psychology; economics, marketing, or finance; architecture or city planning; home economics; and public health. Acceptable background preparation for students who choose the design focus includes the general areas of fine arts, sociology or psychology, architectural design, home economics, and a demonstrated knowledge of design and color. In some of these subjects specialization in only relevant branches of the area is acceptable for either focus. The student should have a general knowledge of the basic concepts of the particular area (or branch of the area) as they apply to the field of housing and to the field of design.

The program for the degree of M.S. varies for each phase of study. Flexibility in programming cares for varying backgrounds and objectives of students. A student desiring a housing focus must obtain a comprehensive knowledge of one of the areas in this field. The student is required to fill in gaps in his background where they exist in such areas as sociology, psychology, architecture (where appropriate courses are available), statistics, and research methods. A student desiring a design focus must obtain a comprehensive knowledge of one of the areas in this field. The candidate is required to fill in gaps in his background where they exist in such areas as design, history of art, home eco-

nomics, sociology or psychology, research methods. The candidate should choose a minor in a related area.

For work toward the Doctor's degree with a major in housing and design the student must expand his knowledge beyond the specialized area in which he focused for work toward the Master's degree. Any requisites described above under the program for the Master's degree must be filled. In addition, some personal experience in either teaching, business, or government is requisite. Two minors are selected from fields related to housing and design.

The student should obtain a thorough knowledge of three of the important areas in which extensive housing research has been undertaken at this University, such as housing values, urban versus rural family housing needs, problems of existing housing inventories, prefabricated housing, problems of decentralization and commuting from rural areas, and any new research areas which may be explored from time to time. Participation is desirable in the housing research studies being undertaken at the University: either in studies where the leadership is in the Department of Housing and Design and the studies are conducted under the Agricultural Experiment Station of Cornell University on New York State funds, or in studies being conducted under the Cornell Housing Research Center. During certain years there are one or more assistantships which are available to advanced graduate students.

INDUSTRIAL AND LABOR RELATIONS (I.L.R.)

Professors M. P. CATHERWOOD, L. P. ADAMS, C. K. BEACH, E. BROOKS, J. M. BROPHY, T. BURLING, M. G. CLARK, L. A. EMERSON, R. H. FERGUSON, P. GORDON, C. A. HANSON, J. J. JEHRING, V. H. JENSEN, M. R. KONVITZ, A. H. LEIGHTON, D. MACINTYRE, P. J. MCCARTHY, J. W. MCCONNELL, J. T. McKELVEY, J. G. MILLER, R. E. MONTGOMERY, J. E. MORTON, P. MULLADY, M. F. NEUFELD, A. W. SMITH, N. A. TOLLES, W. F. WHYTE, B. F. WILLCOX, A. L. WINSOR.

APPROVED MAJOR AND MINOR SUBJECTS

Collective Bargaining, Mediation, and Arbitration 1, 2, 3, 4	Labor Market Economics and Analysis 1, 2, 3, 4
Economic and Social Statistics 1, 2, 3, 4	Labor Union History and Administration 1, 2, 3, 4
Human Relations 1, 2, 3, 4	Personnel Administration 1, 2, 3, 4
Industrial and Labor Relations Problems 4	Social Security and Protective Labor Legislation 1, 2, 3, 4
Industrial Education 1, 2, 3, 4	

Language requirement for Master's degree: proficiency in one language approved by the Special Committee before beginning the second residence unit.

A description of the program leading to the degree of Master of Science in Industrial and Labor Relations, which is designed to provide broad coverage and some specialization, is found in the *Announcement of the School of Industrial and Labor Relations*.

For both the M.S. and Ph.D. degrees emphasis is placed upon independent study and research. The following are minimum requirements prerequisite to the independent investigations required in the major and minor subjects:

COLLECTIVE BARGAINING, MEDIATION, AND ARBITRATION. For a major in this

subject, the candidate must show knowledge of (1) the history, current developments, and issues in labor relations, collective bargaining practices and procedures; (2) the content of trade agreements in different types of industry; (3) state and federal legislation in the field of labor relations, collective bargaining, mediation, and arbitration; (4) leading cases in the field of labor law; (5) administrative agencies and their functions.

For a minor, (1), (3), and (5) are required.

ECONOMICS AND SOCIAL STATISTICS. For a major in this subject the candidate must show (1) good command of the principles of statistical reasoning; (2) proficiency in the use of statistical methods and in the processing of statistical data; (3) qualified skill in the application of proper statistical tools of analysis to a specific topic in economics or social studies, including a thorough knowledge of statistical sources; (4) knowledge of differential and integral calculus.

For a minor, (1), (2), (3) are required, the level being less advanced than for a major.

HUMAN RELATIONS. For a major in this subject, the candidate must present (1) acquaintance with the fields basic in human and social behavior including biology, the physiology of the nervous system, and the psychology of the individual; (2) comprehensive knowledge of relevant areas in social psychology and cultural anthropology, especially the fundamentals of individual and group behavior and the nature of institutions; (3) familiarity with the principal human relations problems commonly found in industrial and labor relations and the bearing of these problems on other fields such as collective bargaining, labor organization, management organization, economics, and law; (4) knowledge of the problems involved in the relationship between industries and communities; (5) thorough knowledge of pertinent research techniques and methods employed in human relations problems; (6) knowledge of resources generally available in educational techniques and in community services that have bearing on human relations problems.

For a minor, (1), (2), and (3) are required.

INDUSTRIAL AND LABOR RELATIONS PROBLEMS. (Offered as a minor only to graduate students in fields of study other than industrial and labor relations.)

A candidate for an advanced degree must have a general understanding of the subject matter in the field of industrial and labor relations. In order to prepare for a minor in this Field, the candidate will normally complete three to five courses in accordance with a program approved by his Special Committee.

INDUSTRIAL EDUCATION. For a major in this subject, the candidate must show (1) comprehensive understanding of industrial and technical education programs in public institutions, private institutions, and industry; (2) ability to develop analyses for instructional purposes and prepare an educational or training program based upon analyses; (3) understanding of economic, social, and scientific factors which may modify industrial and technical education programs; (4) understanding of instructional methods and their application in learning situations; (5) ability to apply administrative and supervisory principles to industrial and technical education programs; (6) detailed knowledge of bibliographies and sources of information in this field.

For a minor, (1), (2), and (4) are required.

LABOR MARKET ECONOMICS AND ANALYSIS. For a major in this subject, the candidate must show (1) comprehensive knowledge of the factors governing labor supply and demand; (2) thorough understanding of basic economic processes, especially in relation to employment, national income, production,

wages, prices, and profits; (3) qualified skill in analyzing some specific labor market relationship such as manpower, labor mobility, wage determination, wage differentials, changes in wage structures, productivity, labor costs, or consumer incomes and expenditures; (4) competence in the use and application of quantitative methods; (5) knowledge of the history and the literature related to the subject.

For a minor, (1), (2), and (4) are required. When this subject is elected as a major, labor economics may not be elected as a minor.

LABOR UNION HISTORY AND ADMINISTRATION. For a major in this subject, the candidate must present (1) a working knowledge of the history of the American labor movement; (2) a working knowledge of the government and administration of the American labor movement; (3) specific and detailed knowledge of the history, government, and administration of international and national labor unions in the United States; (4) familiarity with types of union leadership and rank-and-file behavior; (5) familiarity with the history, government, and administration of labor movements in other countries; (6) detailed knowledge of the bibliography and sources of information in this field.

For a minor in this subject, (1), (2), and (6) are required.

PERSONNEL ADMINISTRATION. For a major in this subject, the candidate must present (1) comprehensive knowledge of the general principles of administration, including personnel organization and operation; (2) ability to appraise critically personnel methods and procedures; (3) knowledge of labor and industrial legislation and functions of government as they relate to the personnel function; (4) knowledge of business and labor organizations and their impact on personnel relations; (5) insight concerning the basic attitudes modifying the relationships between individuals, groups, and organizations; (6) detailed knowledge of the bibliography and sources of information in this field.

For a minor, (1), (2), (3), and (6) are required.

SOCIAL SECURITY AND PROTECTIVE LABOR LEGISLATION. For a major in this subject, the candidate must show (1) familiarity with the sources and nature of insecurity; (2) a comprehensive knowledge of the origin, development, constitutionality, and administration of legislation in such fields as social insurance, minimum wages and hours, protection of women and children, discrimination, health and safety, workmen's compensation, public assistance, and labor relations; (3) a knowledge of the efforts of labor, industry, and the community to meet these problems on a voluntary basis; (4) familiarity with one special field of legislation and the administrative and legal experience in that field; (5) knowledge of the past and current proposals for improving and extending legislation.

For a minor, (1), (2), and (5) are required.

Interviews are desired with all applicants. If at all possible, persons interested in admission should arrange for a visit to Ithaca. Inquiries concerning interviews should be directed to the Director of Student Personnel, New York State School of Industrial and Labor Relations.

Applications for graduate assistantships to begin in September should be received not later than March 1 and, for February, not later than December 1. Write to the Director of Student Personnel for application material.

The Carnegie Corporation of New York has granted funds for two-year fellowships in industrial psychiatry, which provide an opportunity for trained psychiatrists to study at the New York State School of Industrial and Labor Relations and to apply psychiatric knowledge and methods to the problems of industry in actual plant situations. Applicants must hold an M.D. degree and

have completed a minimum of two years of approved training in psychiatry.

Note, also, the special Tuition Scholarships, p. 21.

INSTITUTION MANAGEMENT (H.E.)

Professor Katharine W. Harris, Associate Professors KARLA LONGREE, HELEN RIPLEY.

APPROVED MAJOR AND MINOR SUBJECTS

Institution Management 2, 4

A strong background of undergraduate courses in food and nutrition and the supporting physical and biological sciences and a well-balanced program in other areas of home economics are expected. Undergraduate courses in institution management and some experience in the field of managerial dietetics or commercial food service administration are desirable.

Graduate work leading to the Master's degree may emphasize either the administrative or the more technical aspects of institution management. There is no prescribed program of study for either the major or the minor in this field. It is expected that the program will supplement the student's previous training and experience to achieve a well-rounded knowledge of the subject, with due consideration given to the student's purpose in undertaking graduate study.

Related minors are in other branches of home economics, particularly food and/or nutrition, or in such subjects as personnel administration, agricultural marketing, hotel accounting, and education.

Members of the staff will direct work in the following areas: Professor Harris and Associate Professor Ripley in studies concerned with the administrative problems of large-scale food service operations; Associate Professor Longree, experimental studies in food prepared in quantity.

The Department offers opportunities for experimentation in its laboratories, a cafeteria and a tea room which together serve approximately 2,000 persons daily, and a research kitchen. Several graduate assistantships are available.

LAW

Professors W. H. FARNHAM, H. A. FREEMAN, A. J. KEEFE, A. LARSON, J. W. MACDONALD, R. S. STEVENS, G. J. THOMPSON, H. E. WHITESIDE, B. F. WILLCOX.

APPROVED MAJOR AND MINOR SUBJECTS

Law 4

SOCIOLOGY, RURAL SOCIOLOGY, AND ANTHROPOLOGY (ARTS, AG.)

Professors J. ADAIR, W. A. ANDERSON, M. L. Barron (Soc. & Anthropol.), J. P. DEAN, M. E. DUTHIE, A. R. HOLMBERG, W. W. LAMBERT, O. F. LARSON, A. H. LEIGHTON, J. W. McCONNELL, E. O. MOE, M. E. OPLER, R. A. POLSON, R. RAPOPORT, W. W. Reeder (Rural Soc.), L. SHARP, E. A. SUCHMAN, P. TAETZ, H. E. THOMAS, J. S. TYHURST, J. R. WHITE, W. F. WHYTE, R. M. WILLIAMS, JR.

APPROVED MAJOR AND MINOR SUBJECTS

Sociology 1, 2, 3, 4

Cultural Anthropology 1, 2, 3, 4

Rural Sociology 1, 2, 3, 4

Statistics 2, 3, 4

Language requirement for the Master's degree (Soc. & Anthropol. only): proficiency in one language acceptable to the Special Committee.

For graduate work in any of these fields a student should have a general background in human biology, the social studies, and the humanities. He should also have some knowledge of the basic concepts and applications of social statistics, although deficiencies in this respect can be made up in the course of his work as a graduate student. For graduate work in rural sociology the student should have had, in addition, considerable personal experience with rural life and institutions.

It is recommended that candidates for advanced degrees in sociology, rural sociology, or anthropology should take at least one minor outside these fields.

There are several assistantships which are normally awarded to advanced graduate students. Applications should be made directly to the Department of Sociology and Anthropology or the Department of Rural Sociology.

These departments sponsor various social research programs and field projects in which graduate students may participate directly for purposes of training or research. One such large-scale current project is a community study in intergroup relations, involving an analysis of the factors affecting intergroup attitudes and behavior in a near-by industrial city, a community offering the graduate student a field laboratory for many different kinds of community research. Another is a combined program of instruction and research on the modernization of nonindustrialized areas. In connection with this applied anthropology program, continuing field research projects have been initiated in the American Southwest, South America, India, and Southeast Asia to study the effects of the introduction of modern technology in underdeveloped regions. These and other research programs are carried on under the auspices of the Cornell Social Science Research Center, which is described in the section on Research Centers. One of the functions of the Center is to train graduate students in research methods by permitting them to work on established, active research projects. In rural sociology, a wide range of studies is also being conducted as a research program under the Agricultural Experiment Station of Cornell University. Currently, graduate students are working on experiment station projects in social participation of farm families, values in rural living, rural leadership, rural health, and two experiments in community development.

The requirements for the Doctor's degree are listed below. The requirements for the M.A. or M.S. degrees correspond generally to the minor requirements for the Doctor's degree. (For Social Psychology, see Psychology.)

GENERAL SOCIOLOGY. When offered as a major: (1) a thorough knowledge of the field of sociological theory and its history; (2) a thorough knowledge of the methodology of sociological research; and (3) a detailed knowledge of at least three subfields in sociology, such as cultural anthropology, social psychology, the family, educational sociology, rural sociology, urban sociology, social pathology, criminology, population, statistics.

When offered as a minor: a general knowledge of part (1) of the above requirement and a satisfactory knowledge of one or two subfields.

CULTURAL ANTHROPOLOGY. When offered as a major: (1) a thorough knowledge of the history of anthropology and of anthropological theory and method; (2) familiarity with the major culture areas of the world; (3) a detailed knowledge of the ethnology of at least one such area; (4) a grasp of the principles of linguistics and of physical anthropology, and familiarity with the most important findings of archaeology.

When offered as a minor: parts (1) and (2) of the above requirement.

RURAL SOCIOLOGY. When offered as a major: (1) a thorough knowledge of

the field of sociological theory and its history; (2) a thorough knowledge of the methodology of sociological research; (3) a thorough knowledge of rural sociology and the research in this field; and (4) a detailed knowledge of at least three subfields in sociology, such as cultural anthropology, social psychology, the family, educational sociology, rural sociology, urban sociology, social pathology, criminology, population, statistics.

When offered as a minor: a general knowledge of parts (1) and (3) of the above requirement and a satisfactory knowledge of one other subfield under part (4).

STATISTICS. When offered as a minor for the Ph.D. degree: (1) completion of an approved sequence of courses; (2) completion of a research project which demonstrates that the candidate is able to select methods appropriate to the problems and to employ advanced statistical methods.

TEXTILES AND CLOTHING (H.E.)

Professors G. L. BUTT, M. HUMPHREY, E. F. McMURRY, M. S. RYAN, R. J. SCOTT, H. P. Smith, M. V. WHITE.

APPROVED MAJOR AND MINOR SUBJECTS

Textiles and Clothing 2, 4

Broad home economics training, as well as training in textiles and clothing, and supporting undergraduate work in such related fields as the social sciences, physical sciences, art, and education, is desirable background for graduate work in the field of textiles and clothing.

If a graduate student wishes to concentrate on any limited part of the field, such as its psychological, economic, or aesthetic aspect, she is expected to take a graduate minor in the appropriate field.

BIOLOGICAL AND AGRICULTURAL SCIENCES

AGRICULTURAL ENGINEERING (AG.)

Professors O. C. French, E. W. FOSS, A. M. GOODMAN, B. A. JENNINGS, C. W. TERRY, C. N. TURNER, F. B. WRIGHT; Associate Professors H. E. GRAY, E. S. SHEPARDSON; Assistant Professors L. L. BOYD, W. W. GUNKEL, E. D. MARKWARDT, J. W. SPENCER.

APPROVED MAJOR AND MINOR SUBJECTS

Farm Structures 1, 2, 3, 4

Soil and Water Management 1, 2, 3, 4

Power and Machinery 1, 2, 3, 4

Farm Electrification 1, 2, 3, 4

Agricultural Engineering 1, 2, 3, 4

To be admitted as a candidate for an advanced degree in this field an applicant will be required to have completed the equivalent of a recognized agricultural engineering curriculum with a scholarship ranking in at least the upper half of his class. A knowledge of general agriculture is also essential. This requirement may be satisfied by adequate general farm work experience or formal courses such as botany, soils, field crops, animal husbandry, and farm management.

An applicant who is not able to meet the requirements for candidacy for an advanced degree may arrange for a program of work as a noncandidate.

AGRONOMY (AG.)

Professors R. Bradfield, S. R. ALDRICH, K. C. BEESON, N. C. BRADY, C. S. BRANDT, F. E. BROADBENT, M. G. CLINE, J. E. DAWSON, S. N. FERTIG, W. L. GARMAN, H. B. HARTWIG, W. K. KENNEDY, J. LAMB, D. J. LATHWELL, H. A. MACDONALD, R. D. MILLER, R. B. MUSGRAVE, M. H. PEECH, L. SALTONSTALL, E. L. STONE, P. J. ZWERMAN. At Geneva, Professor A. W. HOFER.

APPROVED MAJOR AND MINOR SUBJECTS

Soils 1, 2, 3, 4

Field Crop Production 1, 2, 3, 4

(a) Special Interests of the Faculty

SOILS:

1. Soil chemistry: Professors Peech, Dawson, Beeson, and Brandt
2. Soil physics: Professors Miller and Zwerman
3. Soil microbiology: Professor Broadbent
4. Soil fertility: Professors Bradfield, Brady, Lathwell, and Garman
5. Soil morphology, genesis, and cartography: Professor Cline
6. Soil conservation: Professors Zwerman and Lamb
7. Forest soils: Professor Stone
8. Organic soils: Professor Dawson

FIELD CROP PRODUCTION:

1. Forage crop production, management, and utilization: Professors MacDonald, Kennedy, and Saltonstall
2. Cereal crops and crop ecology: Professors Musgrave and Aldrich
3. Weed Control: Professor Fertig

Prospective students are urged to correspond with the professor in the above lists whose interests are nearest their own a few months in advance of the time they expect to enter.

(b) Policies Peculiar to the Field

Students preparing for graduate work in agronomy are urged to obtain a thorough knowledge of general physics, mathematics through calculus, analytical, organic, and physical chemistry, general botany, bacteriology, genetics, plant physiology, and geology. Opportunity will be afforded for further study of some of these subjects after entering the Graduate School, but a student deficient in two or more of these foundation courses cannot expect to receive a degree in the minimum time required for residence. Some practical farm experience with soil and crop management problems is also desirable. Opportunity to acquire additional experience will be afforded a limited number of students majoring in the field by summer employment on departmental projects.

Students must consult the professor in charge before registering for any course numbered above 100 (see *Ag.*, Agronomy).

ANIMAL BREEDING AND PHYSIOLOGY (AG.)

Professors S. A. ASDELL, R. W. BRATTON, J. H. BRUCKNER, R. K. COLE, R. H. FOOTE, G. O. HALL, W. HANSEL, C. R. Henderson, F. B. HUTT.

APPROVED MAJOR AND MINOR SUBJECTS

Animal Breeding 1, 2, 3, 4

Animal Genetics 1, 2, 3, 4

Before entering graduate study in animal breeding, the student should have had courses in zoology, general biology, comparative anatomy, physiology, and chemistry, and elementary courses in genetics and animal breeding. Some prac-

tical experience in animal husbandry, poultry husbandry, or plant breeding is desirable.

In the course of their graduate study, students will be expected to take certain courses in animal physiology, biochemistry, embryology, cytology, genetics, biometry, and histology. One or more of these may be selected as a minor subject.

Graduate studies in animal breeding may be taken in several departments of the University, and the student should consult the course offerings of each of these departments.

Work in genetics and breeding of large animals, including physiology of reproduction, is offered in the Department of Animal Husbandry under the supervision of Professors Asdell, Bratton, Foote, Hansel, and Henderson.

Graduate study in animal genetics is offered in the Department of Poultry Husbandry, where work in that field is supervised by Professors Hutt, Cole, Bruckner, and Hall.

It is recommended that those candidates for the Master's degree who expect to become candidates for the doctorate study one or more foreign languages.

ANIMAL HUSBANDRY (AG.)

Professors S. A. ASDELL, R. W. BRATTON, R. H. FOOTE, W. HANSEL, C. R. HENDERSON, J. K. LOOSLI, C. M. McCAY, J. I. MILLER, F. B. MORRISON, J. T. REID, L. H. SCHULTZ, B. E. SHEFFY, S. E. SMITH, G. W. TRIMBERGER, K. L. Turk, R. G. WARNER, J. P. WILLMAN.

APPROVED MAJOR AND MINOR SUBJECTS

Animal Husbandry 1, 2, 3, 4,

Animal Breeding 1, 2, 3, 4

Animal Nutrition 1, 2, 3, 4

Dairy Husbandry 1, 2, 3, 4

Note: If the major for the Ph.D. lies in one of these fields, not more than one of the other three should be selected for a minor.

Although there are no foreign language requirements for the Master's degree, foreign language is recommended for those candidates who expect to go on for the Ph.D.

To enter graduate study in any of the subject matter fields in animal husbandry, the student should have the equivalent of the following courses: elementary feeds and feeding, animal breeding, and the various production courses in dairy and beef cattle, sheep, and swine. Also, the student should have basic courses in biology or zoology, bacteriology, chemistry, organic chemistry, mathematics, physics, animal physiology, and genetics.

In addition to the graduate courses in animal husbandry, candidates for the degrees of M.S. and Ph.D. will be expected to take advanced courses in chemistry, biochemistry, physiology, genetics, biological statistics, and other related fields.

ANIMAL NUTRITION (AG.)

Professors L. L. BARNES, G. F. HEUSER, F. W. HILL, J. K. Loosli, L. A. MAYNARD, C. M. McCAY, F. B. MORRISON, L. C. NORRIS, J. T. REID, M. L. SCOTT, B. E. SHEFFY, S. E. SMITH, R. G. WARNER.

APPROVED MAJOR AND MINOR SUBJECTS

Animal Nutrition 1, 2, 4

To enter upon graduate study with animal nutrition as a major subject, the student should have preparation in general biology or zoology, introductory chemistry, analytical chemistry, organic chemistry, physics, human or animal physiology, and animal breeding or genetics. Some preparation or experience in livestock or poultry production is desirable but not required.

In the course of preparation for an advanced degree, candidates are expected to acquire training in biochemistry, physiology, histology, and statistics. Students are generally advised to select either biochemistry or physiology as minor fields of study for the Master's degree and both of these subjects as minor fields for the doctorate. However, other minor fields of study such as animal breeding, pathology, or organic chemistry may be selected, depending upon the student's interest. Physical chemistry and advanced work in organic chemistry may be required of students particularly interested in the biochemistry of nutrition.

A strong research program in animal nutrition is maintained in the Cornell University Agricultural Experiment Station under the direction of members of the Faculty responsible for the training of graduate students in this field. Students are frequently able to broaden their research training and experience by participating in some of the animal nutrition projects of the Experiment Station. As a research problem for the degree, students are permitted to select, if they desire, various phases of established projects which permit them to exercise originality and independence of thinking.

Students expecting to continue their graduate studies should prepare to meet the language requirement for the doctorate during the course of their preparation for the Master's degree.

BACTERIOLOGY (AG.)

Professors E. A. DELWICHE, G. KNAYSI, H. B. NAYLOR, H. W. SEELEY, JR., J. M. SHERMAN, P. J. VANDEMARK, M. R. Zelle. At Geneva, Professors G. J. HUCKER, C. S. PEDERSON.

APPROVED MAJOR AND MINOR SUBJECTS

Bacteriology 1, 2, 3, 4

(See also Pathogenic Bacteriology
1, 2, 3, 4, p. 70)

Language requirement for Master's degree: college entrance language.

Students planning graduate study in bacteriology should have preparation in general chemistry, qualitative and quantitative analysis, and organic chemistry, and introductory courses in the biological sciences. In addition, training in physical chemistry and calculus is desirable. Deficiency in any of the subjects listed does not necessarily preclude admission but may increase the time necessary to earn a degree.

Well-equipped laboratories are available. Those fields of microbiological research in which the staff is experienced and especially interested include morphology and cytology, physiology and biochemistry, genetics, bacteriophagy, and systematic and applied bacteriology.

It is to be emphasized that in addition to a creditable performance in the formal program of courses leading to a broad knowledge of bacteriology and related fields, the graduate student for an advanced degree is expected to demonstrate ability to plan and conduct independent and original research. The successful culmination of a worthy research project is considered the important prerequisite to the Ph.D. degree.

In Savage Hall: *Professors* L. J. DANIEL, L. A. MAYNARD, A. L. NEAL, W. L. NELSON, P. E. RAMSTAD, J. B. SUMNER, H. H. WILLIAMS. At Geneva: *Professors* A. W. AVENS, F. P. BOYLE, D. C. CARPENTER, D. B. HAND, J. C. HENING, R. W. HOLLEY, Z. I. KERTESZ, F. A. LEE, G. L. MACK, J. C. MOYER, W. B. ROBINSON, A. C. WAGENKNECHT.

Biochemistry 1, 2, 4

Candidates who choose biochemistry as a minor should have adequate training in chemistry and the biological sciences.

Several assistantships are available each year and applications for these should be made directly to the Faculty representative.

Professors H. P. BANKS, D. G. CLARK, R. T. CLAUSEN, W. C. MUENSCHER, L. C. PETRY, L. F. Randolph, F. C. STEWARD, and C. H. UHL. At Geneva, Professors F. P. BOYLE, B. E. CLARK, W. F. CROSIER, JOHN EINSET, and M. T. MUNN. At the Bailey Hortorium, Professors G. H. M. LAWRENCE and H. E. MOORE, JR.

Botany 2, 4	Plant Morphology and Anatomy 1, 2, 3, 4
Cytology 1, 2, 3, 4	Plant Physiology 1, 2, 3, 4
Economic Botany 1, 2, 3, 4	Plant Taxonomy 1, 2, 3, 4
Paleobotany 1, 2, 3, 4	

General Requirements for All Degrees

Requirements for Major Subjects

Additional basic requirements for the major subjects are as follows:

BOTANY. Additional requirements will be determined in each individual case.

CYTOLOGY. An adequate knowledge of cytology and two of the following: an adequate knowledge of genetics or plant breeding, additional training in plant morphology and anatomy, plant physiology, or plant taxonomy. Professors Randolph and Uhl.

ECONOMIC BOTANY. Additional training in plant physiology and plant taxonomy, and adequate knowledge of one of the following: bacteriology, genetics, mycology, or plant breeding. Professor Muenscher.

PALEOBOTANY. Additional training in plant morphology and anatomy, and adequate knowledge of paleobotany and general and stratigraphic geology. Professors Banks and Petry.

PLANT MORPHOLOGY AND ANATOMY. Additional training in plant morphology and anatomy and plant taxonomy and adequate knowledge of cytology, genetics, or paleobotany. Professors Banks and Petry.

PLANT PHYSIOLOGY. Additional training in plant physiology, an adequate knowledge of chemistry, a general knowledge of mathematics and physics, and training in bacteriology, genetics, mycology, plant pathology, or soils. Professors Clark and Steward.

PLANT TAXONOMY. Additional training in plant taxonomy and an adequate knowledge of cytology or genetics. Professors Clausen and Muenscher.

Opportunity for graduate research in plant taxonomy, with the same requirements, is also available to a limited number of graduate students at the Bailey Hortorium. Research programs at the Hortorium deal primarily with cultivated plants but are necessarily based on studies of indigenous plant populations. Professors Lawrence and Moore.

Research at the New York State Agricultural Experiment Station

Opportunity for graduate research is also available, in the fields of cytology and plant physiology, particularly of cultivated plants, and of seed investigations, at the New York State Agricultural Experiment Station at Geneva, N.Y. Correspondence with regard to research at the Experiment Station should be addressed to the representative for the field of botany, Professor Randolph, at the Department of Botany, Cornell University, Ithaca, N.Y.

CONSERVATION (AG.)

Professors A. A. ALLEN, J. C. AYERS, D. C. CHANDLER, W. R. EADIE, C. H. GUISE, W. J. HAMILTON, JR., O. H. HEWITT, P. P. KELLOGG, R. R. MORROW, E. L. PALMER, A. M. PHILLIPS, JR., E. C. RANEY, G. A. Swanson, D. A. WEBSTER.

APPROVED MAJOR AND MINOR SUBJECTS

Fishery Biology 1, 2, 3, 4	Oceanography 1, 2, 3, 4
Forest Conservation 2, 4	Ornithology 1, 2, 3, 4
Herpetology 1, 2, 3, 4	Vertebrate Taxonomy and Ecology 3, 4
Ichthyology 1, 2, 3, 4	Wildlife Management 1, 2, 3, 4
Mammalogy 1, 2, 3, 4	

Language requirement for the Master's degree: college entrance French and/or German or an approved substitute.

To undertake graduate study the student should be well prepared in general and vertebrate zoology and should have or must acquire a foundation in the specialized field of study which he intends to pursue. A strong background in the other natural and physical sciences is highly desirable, and a working knowledge of statistical methods is important in all fields. Staff members are available to direct graduate study during the regular University Summer Session, and selected summer courses are offered.

Applicants for graduate study in conservation are expected to submit Graduate Record Examination scores for the aptitude and profile tests. Applicants whose cases must be considered before the Graduate Record Examination scores are available may be recommended for admission as noncandidates pending satisfactory scores in the Graduate Record Examination.

Attention is also directed to the fields of study and courses offered in the Departments of Botany (*Ag.*), Zoology (*Arts*), and Entomology and Limnology (*Ag.*). Graduate study in conservation education is directed by Professor Palmer (*Ed.*, Nature Study and Science Education).

Preregistration is required for all courses in conservation.

DAIRY SCIENCE (AG.)

Professors J. M. SHERMAN, A. C. DAHLBERG, B. L. HERRINGTON, R. F. HOLLAND, W. K. JORDAN, F. V. KOSIKOWSKY, V. N. KRUKOVSKY, H. B. NAYLOR, W. F. SHIPE, JR., J. C. WHITE.

APPROVED MAJOR AND MINOR SUBJECTS

Dairy Science 1, 2, 3, 4

Dairy Chemistry 1, 2, 3, 4

Language requirement for Master's degree: proficiency in French or German or approved substitute.

The research interests of the individual members of the staff are broad, but, in general, they may be indicated as follows: J. M. Sherman, bacteriology; A. C. Dahlberg, technology of milk products; B. L. Herrington, physicochemical studies of milk products; R. F. Holland, market milk and related products; W. K. Jordan, dairy engineering; ice cream, and concentrated milk products; F. V. Kosikowsky, biochemistry, bacteriology, and technology of dairy products; V. N. Krukovsky, biochemistry of milk and fat-containing food products, enzymes, vitamins, antioxidants and "off flavor" development; H. B. Naylor, dairy bacteriology; W. F. Shipe, Jr., enzymatic reactions in dairy products; J. C. White, sanitary and technical problems of milk and milk products.

Those intending to major in dairy science should have preparation in calculus; physics; bacteriology; qualitative, quantitative, and organic chemistry; as well as elementary courses in dairy industry.

Those intending to major in dairy chemistry should offer calculus; physics; qualitative, quantitative, organic, and physical chemistry. Training in dairy industry is desirable but not essential. Deficiency in any of the subjects listed is not necessarily a bar to admission, but it may increase the time needed to earn the degree.

In general, graduate students are expected to acquire a broad knowledge of the chemical, physical, and biological properties of milk and its products. However, mastery of the subject material and the acquisition of residence units alone are not sufficient to earn the degree. Candidates must show that they have matured as students, and that they are able to conduct *independent* and *intensive* study in the laboratory and in the library.

ENTOMOLOGY AND LIMNOLOGY (AG.)

In Comstock Hall: Professors W. E. BLAUVELT, J. L. BRANN, F. H. BUTT, D. C. CHANDLER, W. L. COGGSHALL, J. E. DEWEY, HENRY DIETRICH, E. J. DYCE, W. T. M. FORBES, G. G. GYRISCO, J. D. HOOD, H. C. HUCKETT, A. A. LAPLANTE, R. W. LEIBY, J. G. MATTHYSSE, L. B. NORTON, C. E. Palm, V. S. L. PATE, R. L. PATTON, W. A. RAWLINS, H. H. SCHWARDT, B. V. TRAVIS, L. D. UHLER, T. C. WATKINS, and D. A. WEBSTER. At Geneva: Professors J. A. ADAMS, P. J. CHAPMAN, A. C. DAVIS, R. W. DEAN, F. L. GAMBRELL, E. H. GLASS, G. E. R. HERVEY, S. E. LIENK, F. G. MUNDINGER, E. H. SMITH, K. G. SWENSON, E. F. TASCHENBERG.

APPROVED MAJOR AND MINOR SUBJECTS

Apiculture 1, 2, 3, 4	Insect Physiology 1, 2, 3, 4
Insect Ecology 1, 2, 3, 4	Insect Toxicology 1, 2, 3, 4
Economic Entomology 1, 2, 3, 4	Insecticide Chemistry 1, 2, 3, 4
Insect Morphology and Histology 1, 2, 3, 4	Medical Entomology 1, 2, 3, 4
Insect Embryology 1, 2, 3, 4	Parasitology 1, 2, 3, 4
Insect Taxonomy 1, 2, 3, 4	Limnology 1, 2, 3, 4
	Entomology 4

Language requirement for the Master's degree: proficiency in one language before the last term or exemption by the Special Committee.

To undertake graduate study the student should not only be prepared in the fundamentals of animal biology and related fields but also have or acquire a foundation in the particular phase of the subject which he intends to pursue. In the summer, members of the staff are prepared to direct the research of graduate students in connection with the Summer Session of Cornell University.

Special facilities for research include the Comstock Memorial Library of over 30,000 volumes and the Everett Franklin Phillips Beekeeping Library of more than 3,000 volumes, each supplemented by thousands of reprints; sets of practically every entomological serial ever published; an extensive insect collection of North American and exotic insects, mostly determined by specialists and especially rich in Lepidoptera, Hymenoptera, Coleoptera, Odonata, and many other orders; and an insectary for research on problems related to insect biology, ecology, toxicology, and the chemistry of insecticides.

FLORICULTURE AND ORNAMENTAL
HORTICULTURE (AG.)

Professors: J. F. CORNMAN, R. E. LEE, L. H. MACDANIELS, K. POST, J. P. PORTER, A. M. S. PRIDHAM, W. E. Snyder.

APPROVED MAJOR AND MINOR SUBJECTS

Floriculture and Ornamental Horticulture: 1, 2, 4

Language requirement for the Master's degree: proficiency in one language, preferably German or French.

Members of the staff of this field are concerned with greenhouse crops, nursery crops, turf, plant materials, breeding of ornamental plants, and the

problems of landscaping as applied to small properties.

Since many of the problems dealing with greenhouse and nursery crops, turf, and the breeding of ornamental plants are basically those of plant response with relation to the environment, it is expected that the entering graduate student will have adequate preparation in elementary horticulture, botany, plant physiology, genetics, pathology, agronomy, entomology, chemistry, and physics. Studies relating to the propagation, nutrition, culture and improvement of ornamental plants may be undertaken as research for an advanced degree and should be approached from the standpoint of the basic sciences. Consequently it is appropriate to select minor fields of study from physiology, anatomy, morphology, taxonomy, pathology, genetics, agronomy, entomology, agricultural economics, agricultural engineering, etc.

Studies involving the use of plant materials and problems of design relating to landscape service for small properties may be suitable, in which case it is expected that the student will have an adequate background in the basic principles of horticulture and plant science as well as in design and drawing.

Graduate students interested in problems concerned with the revision of taxonomic groups of ornamental plants are referred to the section of this Announcement describing the facilities of the L. H. Bailey Hortorium (page 62).

FOOD AND NUTRITION (H.E.)

Professors A. M. BRIANT, F. FENTON, H. M. Hauck, F. A. JOHNSTON, K. LONGREE, L. A. MAYNARD, C. M. McCAY, C. J. PERSONIUS, M. C. PFUND, B. F. STEELE, G. STEININGER, C. M. YOUNG.

APPROVED MAJOR AND MINOR SUBJECTS

Food and Nutrition 1, 2, 3, 4

Food 1, 2, 3, 4

Nutrition 1, 2, 3, 4

For students who wish to major or minor in the field of food and nutrition, a wide variety of offerings is available both as to course work and opportunities for independent study. Information concerning these offerings may be obtained by writing to the Graduate Faculty representative in the field of food and nutrition. No set program of study is prescribed for a major or minor in this field. The student's program is planned to give her a well-rounded knowledge of the subject, after consideration of her previous background and her purpose in graduate study.

Although the majority of students who undertake graduate work in this field have had basic courses in home economics, a student whose undergraduate major emphasis was in chemistry, biology, or the social sciences and who wishes to major or minor in the field of food and nutrition may be accepted. Such a student is expected to gain an appreciation of the broad field of home economics during the course of her graduate study.

For graduate work in food and nutrition, an elementary knowledge of physiology and biochemistry is required. While the essential background varies with the student's purpose, a knowledge of quantitative analysis, biology, bacteriology, physics, mathematics, statistics, and the social sciences is desirable. Study in these related fields may be undertaken by the student during the course of her graduate work.

Members of the staff will direct research in the following areas: Professor Briant, in the properties of foods in relation to home preparation, processing and nutritive value of flour and starch products; Professor Fenton in the prop-

erties of foods in relation to home preparation, processing and nutritive value of vegetables, meats, and fruits; Professors Personius and Pfund, experimental studies on food; Professor Longree, experimental studies on food prepared in quantity; Professors Johnston and Steele, experimental studies in human nutrition; Professor McCay, nutrition studies involving the use of small animals; Professors Hauck and Steininger, studies involving research on topics relating to human nutrition.

GENERAL BIOLOGY

Roberts Hall: *Professor Hood*

APPROVED MINOR SUBJECT

General Biology 4

PLANT BREEDING (AG.)

Professors S. S. Atwood, H. L. EVERETT, W. T. FEDERER, N. F. JENSEN, A. A. JOHNSON, J. R. LIVERMORE, H. M. MUNGER, R. P. MURPHY, H. H. SMITH, A. M. SRB, R. G. WIGGANS, T. L. YORK. At Geneva: Professors D. W. BARTON, J. EINSET, R. WELLINGTON.

APPROVED MAJOR AND MINOR SUBJECTS

Plant Breeding 1, 2, 3,* 4

Statistical Methods of Analysis 1, 2, 3, 4

Genetics 1, 2, 3,* 4

Language requirement for the Master's degree: college entrance French or German or substitute approved by the Special Committee.

Students who are interested in crop improvement through breeding will register in *plant breeding*. Problems for research may involve studies of breeding technics, the application of genetic principles to breeding, and the correlation of knowledge from other fields in attacks on problems such as yield, quality, adaptability, and disease and insect resistance. The department now has active research projects with most of the important field and vegetable crops of New York, and certain materials from these are available for graduate student problems. Those students interested in theoretical phases will register in *genetics*, and their research problems generally will deal with genic and chromosomal analyses of hereditary and evolutionary phenomena. Almost any suitable biological materials can be utilized, but the most readily available ones will be those currently being studied by the departmental staff in genetic investigations. For those students to whom problems of experimental technic and mathematical analysis of biological data hold the greater appeal, registration will be in *statistical methods of analysis*.

It is advisable that the student entering upon graduate work be well grounded in the fundamentals of the natural sciences. He should have had elementary courses in inorganic and organic chemistry, college algebra, botany or zoology or biology, and plant, animal, or human physiology. Students intending to specialize in biological statistics will find it to their advantage to have additional training in mathematics. Broad training and experience in the field of agriculture are essential for those planning to major in the field of plant breeding.

Students majoring in plant breeding or genetics will find it necessary to

*Not approved as minor subject when major is in genetics or plant breeding.

remain in Ithaca during the summer, or to make satisfactory arrangements for growing and studying elsewhere the material used in connection with their research problems.

Members of the staff will be especially interested in directing research in the field as listed, although research will not be limited to these fields: Professor Atwood, forage crops—cytogenetics; Professor Murphy, forage crops—genetics and breeding; Professor Jensen, cereal grains—genetics and breeding; Professors Munger and York, vegetable crops—genetics and breeding; Professor Livermore, potato breeding; Professor Everett, corn genetics and breeding; Professor Wiggans, corn breeding; Professor Johnson, extension and seed programs; Professor Smith—plant genetics and evolution; Professor Srb, biochemical genetics; and Professor Federer, biological statistics. Prospective students will find it to their advantage to correspond with the staff member whose interests are most closely related to their own some months in advance of the time they wish to enter, since only a limited number of students can be accommodated.

PLANT PATHOLOGY (AG.)

Professors C. W. BOOTHROYD, W. H. BURKHOLDER, A. B. BURRELL, C. CHUPP, A. W. DIMOCK, K. H. FERNOW, *G. C. Kent*, R. P. KORF, B. LEAR, W. F. MAI, L. M. MASSEY, W. D. MILLS, A. G. NEWHALL, K. G. PARKER, L. C. PETERSON, A. F. ROSS, L. J. TYLER, D. S. WELCH, R. E. WILKINSON. *At Geneva: Professors* A. J. BRAUN, R. M. GILMER, J. M. HAMILTON, J. J. NATTI, D. H. PALMITER, W. T. SCHROEDER, M. SZKOLNIK.

APPROVED MAJOR AND MINOR SUBJECTS

Mycology 1, 2, 3, 4

Plant Pathology 1, 2, 3, 4

Language requirements for Master's degree: proficiency in French or German before second term.

The Faculty usually does not advise a minor in one of these subjects when the major is in the other.

Majors in plant pathology are expected to become familiar with the principles underlying the initiation of infection by the major groups of plant pathogens, the course of infection, the relation of environment to disease, the principles and methods of disease control, and the interrelation of pathogen and susceptible. The student must become familiar with the various techniques useful in studying the details of the diseases and of their control. Individual research will be carried on in one area of the field. Students should spend their summers in field work under professors' direction in order to come into contact with diseases under natural conditions and the practical aspects of control. They should have some practice in teaching. Candidates should have a knowledge of elementary physics, inorganic chemistry, organic chemistry, general botany, plant histology and anatomy, and plant physiology. Opportunity is afforded for further study in these fields, but students with deficiencies cannot expect to complete the degree in the minimum amount of residence.

Majors in mycology are expected to become familiar with the broad field of mycology, including morphology, taxonomy, physiology, genetics, and cytology. It is expected that the student will become proficient in the various techniques used in the study of fungi. Individual research will be concentrated in one phase of the field. Students will profit by spending their summers in the field, collecting and examining fungi in the fresh state. Candidates should possess a thorough grounding in general botany. Opportunity is afforded for

further study in related fields, such as taxonomic botany, morphology and anatomy, microtechnique, plant physiology, biochemistry, genetics, and cytology.

A limited number of assistantships providing opportunities for research and teaching are available in the department.

POMOLOGY (AG.)

Professors D. BOYNTON, L. J. EDGERTON, A. J. HEINICKE, M. B. HOFFMAN, R. M. Smock. At Geneva: *Professors* O. F. CURTIS, J. EINSET, G. H. HOWE, R. C. LAMB, D. R. RODNEY, N. J. SHAULIS, G. L. SLATE, R. WELLINGTON.

APPROVED MAJOR AND MINOR SUBJECTS

Pomology 1, 2, 4

Laboratory, greenhouse, orchard, and cold storage facilities at Ithaca and Geneva are available for graduate study. Special facilities for research in fruit breeding, nursery stock investigations, and other phases of pomology are also available at Geneva.

Minor subjects may be such as plant physiology, plant anatomy, cytology, soil chemistry, soil physics, biochemistry, and chemistry. One minor in botany, particularly plant physiology, is urged.

To enter upon graduate work, the student should have the equivalent of the following courses: general botany, elementary plant physiology, economic entomology, elementary plant pathology, introductory inorganic and elementary organic chemistry, elementary pomology, and systematic pomology.

Candidates for the Master's degree should spend one summer at Ithaca or Geneva or in the field investigating their special subject. At least two summers of work are expected of candidates for the doctorate.

POULTRY HUSBANDRY (AG.)

Professors J. H. Bruckner, R. K. COLE, G. O. HALL, G. F. HEUSER, F. W. HILL, F. B. HUTT, L. C. NORRIS, A. L. ROMANOFF, M. L. SCOTT.

APPROVED MAJOR AND MINOR SUBJECTS

Animal Genetics 1, 2, 3, 4

Chemical Embryology 1, 2, 3, 4

Animal Nutrition 1, 2, 3, 4

Poultry Husbandry 2, 4

It is desirable that graduate students electing a major subject in these fields should have had some undergraduate training in poultry husbandry, some experience in that field, and courses in zoology or animal biology, physiology, physics, and chemistry. Other requirements will be specified by the major adviser.

It is recommended that those candidates for the Master's degree who expect to become candidates for the doctorate study one or more foreign languages.

For further information on animal genetics and animal nutrition see pages 59-60.

PSYCHOLOGY (ARTS)

Professors U. BRONFENBRENNER, R. H. DALTON, F. S. FREEMAN, J. J. GIBSON, H. HARVEY, J. E. HOCHBERG, W. W. LAMBERT, H. S. LIDDELL, R. B. MacLeod, K. C. MONTGOMERY, T. A. RYAN, P. C. SMITH, A. L. WINSOR.

APPROVED MAJOR AND MINOR SUBJECTS

Comparative Psychology 1, 2, 3, 4	History of Psychology and Systematic Psychology 1, 2, 3, 4
Differential Psychology and Psychological Tests 1, 2, 3, 4	Industrial Psychology 1, 2, 3, 4
Experimental Psychology 1, 2, 3, 4	Personality and Social Psychology 1, 2, 3, 4
Experimental Psychopathology 1, 2, 3, 4	Psychobiology 1, 2, 3, 4
General Psychology 2, 4	

Language requirement for the Master's degree: proficiency in French or German before the final examination.

The research laboratories of the Department of Psychology (*Arts*) are located in Morrill Hall and at the Cornell Behavior Farm. Additional research facilities are provided by the Department of Sociology and Anthropology (*Arts*), the Department of Child Development and Family Relationships (*H.E.*), the School of Education (*Ed.*), and the School of Industrial and Labor Relations (*I.L.R.*). Since much of the graduate instruction and research in psychology is conducted co-operatively, the prospective student should consult the Announcements of each of these departments.

VEGETABLE CROPS (AG.)

Professors H. J. CAREW, J. H. ELLISON, A. R. HAMSON, J. D. Hartman, W. C. JACOB, G. A. JOHANNESSEN, W. C. KELLY, M. W. MEADOWS, H. M. MUNGER, A. J. PRATT, G. J. RALEIGH, ORA SMITH, R. D. SWEET, and T. L. YORK. At Geneva: Professors D. W. BARTON, C. B. SAYRE, W. T. TAPLEY, M. T. VITTUM.

APPROVED MAJOR AND MINOR SUBJECTS

Vegetable Crops 1, 2, 4

Research and study in vegetable crops involve the application of fundamental scientific knowledge and methods to the solution of the problems of production and handling in the vegetable industry. These problems include control of flowering and fruiting, use of organic chemical growth regulators, determinations of fertilizer and irrigation requirements, adaptation of rapid tests for diagnosing nutrient deficiencies, development of objective methods for the determination of edible and market quality, physiological effects of various methods of harvesting, shipping, packaging, storing, and merchandising vegetables, control of physiological diseases, use of herbicides, and the like.

To enter upon graduate work in this field the student should have the equivalents of the following courses: Botany 1 and 31, Plant Pathology 1, Entomology 12, Agronomy 1, and Vegetable Crops 1 (*Ag.*). In case a student has not had the equivalent of any one of these courses, he should take it in the first year of his graduate study. Basic training in quantitative analysis, organic chemistry, physics, and mathematics through analytical geometry or calculus is highly desirable.

Students taking either a major or a minor are required to take Vegetable Crops 2, 101, 112, 113, and 225 (*Ag.*) and to attend the department seminar except in semesters when the seminar conflicts with another required course.

Course work in other departments is regularly required as a part of a major program in vegetable crops.

VETERINARY MEDICINE (VET.)

Professors: D. W. BAKER, J. A. BAKER, J. BENTINCK-SMITH, D. W. BRUNER, A. G. DANKS, R. W. DOUGHERTY, H. H. DUKES, J. A. DYE, M. G. FINCHER, J. H. GILLESPIE, H. L. GILMAN, W. A. Hagan, E. P. LEONARD, P. P. LEVINE, K. MCENTEE, M. E. MILLER, J. M. MURPHY, P. OLAFSON, S. J. ROBERTS, H. C. STEPHENSON, J. H. WHITLOCK.

APPROVED MAJOR AND MINOR SUBJECTS

Veterinary Anatomy 1, 2, 3, 4	Parasitology 1, 2, 3, 4
Animal Physiology 1, 2, 3, 4	Veterinary Medicine 1, 2, 3, 4
Veterinary Pathology 1, 2, 3, 4	Veterinary Obstetrics and Diseases
Pathogenic Bacteriology 1, 2, 3, 4	of the Reproductive Organs 1, 2, 3, 4
Veterinary Virology 1, 2, 3, 4	Veterinary Surgery 1, 2, 3, 4

For candidates for the Master's degree a reading knowledge of German and French or Spanish is very desirable but not required.

ZOOLOGY (ARTS)

Professors H. B. Adelmann, L. C. COLE, P. W. GILBERT, D. R. GRIFFIN, S. L. LEONARD, M. J. SINGER, and W. A. WIMSATT.

APPROVED MAJOR AND MINOR SUBJECTS

Comparative Anatomy 1, 2, 3, 4	Endocrinology 1, 2, 3, 4
Comparative and General Physiology 1, 2, 3, 4	Histology and Embryology 1, 2, 3, 4
Comparative Neurology 1, 2, 3, 4	Invertebrate Zoology 1, 2, 3, 4
Ecology 1, 2, 3, 4	

Language requirement for the Master's degree: proficiency in German or French.

Applicants for graduate study in zoology must take the Graduate Record Examination Aptitude Test in sufficient time to permit consideration of the results along with the application for admission to the Graduate School.

All applicants should be well prepared in the fundamentals of biology, and they should have completed courses in organic chemistry and elementary physics. Although an exceptional student may be admitted without having completed the equivalent of a well-rounded college major in zoology, he should then expect to remain in residence beyond the minimum period.

The Department of Zoology offers excellent opportunities for graduate study and research in zoology generally, and, particularly, in the descriptive and experimental aspects of the following special fields:

(1) ANATOMY, comparative and human, with special emphasis on functional anatomy (Professors Gilbert and Singer).

(2) COMPARATIVE and GENERAL PHYSIOLOGY (Professor Griffin).

- (3) ECOLOGY (Professor Cole).
- (4) EMBRYOLOGY and HISTOLOGY, including histochemistry (Professors Adelman and Wimsatt).
- (5) ENDOCRINOLOGY (Professor Leonard).
- (6) INVERTEBRATE ZOOLOGY (Professor ——).
- (7) NEUROLOGY, comparative and functional (Professor Singer).

The program of each graduate student is individually arranged, in conference with his Special Committee, to assure (1) a broad training in all the fundamental aspects of animal biology, and (2) research achievement in the work leading to an acceptable thesis.

In addition to courses offered by the Department of Zoology (*Arts*), other courses of study that are often valuable to graduate students (either as individual courses or as minor subjects) are: chemistry (especially organic and physical chemistry), geology, mathematics, psychology, and physics (*Arts*); bacteriology, biochemistry, botany, conservation, entomology, genetics (Department of Plant Breeding), and physiology of reproduction (Department of Animal Husbandry) (*Ag.*); and Physiology (*Vet.*).

PHYSICAL SCIENCES AND MATHEMATICS

AERONAUTICAL ENGINEERING (*ENGIN.*)

Professors A. R. KANTROWITZ, Y. H. KUO, C. RIPARBELLI, N. ROOT, W. R. SEARS.

APPROVED MAJOR AND MINOR SUBJECTS

Aeronautical Engineering 1, 3, 4

Aerodynamics 4

In this field of graduate study emphasis is placed on the aeronautical sciences rather than mere proficiency in present-day techniques. Consequently, graduate students having aeronautical engineering as their major subject will be urged to select as their minor subjects the basic sciences, such as mathematics, physics, and mechanics.

Much of the research carried out in this field at Cornell is concerned with fundamental problems in the dynamics of fluids. Whenever possible, these investigations combine the techniques of theory and laboratory experiment, making use of the experimental facilities of the Graduate School of Aeronautical Engineering, on the campus. In every investigation, an attempt is made to correlate theory with observation and practical experience.

A group working under the direction of Professor Kantrowitz is investigating the dynamics of gases at extreme temperatures. Generally speaking, their interests lie in matters in which the phenomena of atomic physics are finding application to aerodynamics. This brings the group into close contact with several other groups in the University. Another group, which includes Professors Kuo, Rott, and Sears, is carrying out research on subjects basic to modern wing theory and power plant theory. These include investigations of the turbulent boundary layer and of three-dimensional boundary-layer problems in general. Other investigations typical of the group's activities are shock-boundary-layer interaction and unsteady flow about wings and rotating compressors. Under Professor Riparbelli's direction, research is being pursued in the general field of structural dynamics, with special emphasis on transient

stress propagation, especially in the plastic regime. These investigations are both theoretical and experimental.

Candidates for the Ph.D. with a major in this field who do not already hold the Master's degree will be encouraged to matriculate first as candidates for the professional degree, M.Aero.E., under the jurisdiction of the Graduate School of Aeronautical Engineering. Information concerning this School and the degree M.Aero.E. will be found in the *Announcement of the College of Engineering*.

ASTRONOMY (ARTS)

Professors M. S. CARPENTER, R. W. Shaw.

APPROVED MAJOR AND MINOR SUBJECTS

Astronomy 1, 2, 4

Astrophysics 1, 2, 4

Language requirement for the Master's degree: proficiency in French or German.

Applicants for admission are required to offer the equivalent of introductory astronomy, six hours of interpretational astronomy, six hours of electives in the Field of Astronomy, and evidence of the completion of sufficient work in physics and mathematics to assure the successful pursuance of advanced work in astronomy.

Candidates for the degree of Doctor of Philosophy with a major in astronomy or astrophysics are required to take one minor in physics unless a divided major is granted. In special cases a major in astronomy or astrophysics may consist partly of selected courses in physics. In such cases one minor need not be in physics.

Candidates electing a minor in the Field may select such courses as meet their requirements, provided the necessary prerequisites are offered.

Students with advanced standing in the sciences or in mathematics who do not desire to major or minor in astronomy may be admitted after consultation with the professor in charge to such courses in astronomy as seem desirable.

CHEMICAL ENGINEERING (ENGIN.)

Professors J. E. HEDRICK, C. W. MASON, F. H. RHODES, J. C. SMITH, R. L. VON BERG, H. F. WIEGANDT, C. C. Winding.

APPROVED MAJOR AND MINOR SUBJECTS

Chemical Engineering 1, 2, 4

To qualify for admission, a student must have completed satisfactorily a course substantially equivalent in its technical content to the course leading to the degree of Bachelor of Chemical Engineering at Cornell University. Exact equivalency, subject for subject and credit hour for credit hour, is neither required nor expected, but the previous training must be such as to prepare the applicant for effective work in chemical engineering at the graduate level.

However, for candidates centering their instruction and research in chemical microscopy, undergraduate training in chemical engineering is not required.

Minor subjects must be chosen, for example, from metallurgical engineering or other divisions of engineering, chemistry, physics, mathematics, business and public administration, or industrial and labor relations.

Candidates are expected to pursue a course of study that will give them a deeper comprehension of the basic and applied sciences and will develop initia-

tive, originality, and creative ability. Graduate courses are offered in thermodynamics, reaction kinetics, economics, statistics, the unit operations of chemical engineering, and petroleum refining, and in the chemistry and technology of rubbers and plastics. Specific programs are planned to fit the objectives of the student and to develop original thinking. The student is not required to take an arbitrarily fixed series of courses.

Research work for the thesis may be in the specific fields of unit operations, thermodynamics, reaction kinetics, chemical processes, design, chemical engineering economics, petroleum processes, rubber, or plastics.

CHEMISTRY (ARTS)

Professors S. H. BAUER, R. BERSOHN, A. T. BLUMQUIST, N. A. BONNER, T. R. BRIGGS, W. D. COOKE, PETER DEBYE, D. F. DETAR, P. J. FLORY, J. L. HOARD, J. P. HUNT, J. R. JOHNSON, A. W. LAUBENGAYER, F. A. LONG, W. T. Miller, M. L. NICHOLS, R. K. OSTERHELD, H. POSVIC, H. A. SCHERAGA, M. J. SIENKO.

APPROVED MAJOR AND MINOR SUBJECTS

Inorganic Chemistry 1, 2, 3, 4

Organic Chemistry 1, 2, 3, 4

Analytical Chemistry 1, 2, 3, 4

Physical Chemistry 1, 2, 3, 4

Language requirement for the Master's degree: proficiency in French or German or an approved substitute.

When applying for admission, a prospective graduate student is strongly advised to communicate with the representative or with a member of the Faculty in the branch of chemistry in which he wishes to have his major subject.

The program of graduate study in chemistry is designed to give a broad training in the fundamental knowledge of chemistry and in methods of research. A graduate student will ordinarily pursue these objectives by taking advanced courses, by participation in organized and informal seminars and discussions with his associates and Faculty members, and by carrying out and reporting on a research project in his major field. Upon completion of their study program, graduates normally go out to positions in research laboratories or to positions involving teaching and research.

Candidates for the degree of Master of Arts, Master of Science, or Doctor of Philosophy with major in chemistry will be required to offer for admission the equivalent of the following courses: Introductory Inorganic Chemistry 105 and 106; Qualitative Analysis 201 or 212; Quantitative Analysis 215, or 220 and 222; Introductory Organic Chemistry 307 and 308 and 311; Introductory Physical Chemistry 403 and 404 or 407 and 408, and 411 (*Arts*). They must also present the equivalent of two units of German (*Arts*).

Candidates for the degree of Doctor of Philosophy with major in chemistry must have completed, before the beginning of the last year of residence, the equivalent of Quantitative Analysis 220 and 222, Introductory Organic Chemistry Laboratory 312, and Introductory Physical Chemistry Laboratory 412. Graduate students entering from approved universities may take, during their residence for the advanced degree, such of these required courses as they have not already pursued. If a graduate student lacks at entrance several of these preliminary courses, more than the usual period of residence may be required.

Proficiency tests will be required of all entering candidates for advanced degrees (M.S. or Ph.D.) with a major in chemistry. These tests are given a few days before registration for the fall term and cover the divisions of inorganic, analytical, organic, and physical chemistry. Each test will be about two

and one-half hours in length and will cover material normally presented in elementary courses in the subjects listed above.

Results of these tests will be used to aid the student's Special Committee in the selection of his program of courses. While the results will not be considered in the usual sense of "passing" or "failing," low marks in one or more of the tests may require a preponderance of elementary courses during a term and reduced residence units for that term.

Graduate students are required to register with the Department of Chemistry on the registration days at the beginning of each term. Entering students will consult with the chairman of the departmental Graduate Scholarship Committee at this time.

In addition to the courses in chemistry (*Arts*), attention is directed to courses in chemical engineering, including chemical microscopy (*Engin.*), and to work in biochemistry, offered in the School of Nutrition.

A graduate student who desires to take a minor subject in chemistry, with some field other than chemistry as the major subject, will generally be required to offer introductory courses in inorganic chemistry, qualitative and quantitative analysis, and organic chemistry as preliminary to his graduate study. The work upon his minor subject in chemistry may be taken in any branch of the subject that he is qualified to pursue and comprises advanced courses selected with the approval of his Special Committee.

Fellowships and scholarships are usually awarded only for the last year of residence for the doctorate. Ordinarily research assistantships are awarded only to students who have completed one or more years of residence. Teaching assistantships are open to entering graduate students. Applications for teaching or research assistantships should be addressed to the chairman of the Department of Chemistry, Baker Laboratory.

CIVIL ENGINEERING (*ENGIN.*)

Professors D. J. BELCHER, P. P. BIJLAARD, M. BOGEMA, N. A. Christensen, C. CRANDALL, G. P. FISHER, C. D. GATES, J. C. GEBHARD, H. M. GIFFT, B. K. HOUGH, H. T. JENKINS, A. L. JORISSEN, T. D. LEWIS, W. O. LYNCH, G. B. LYON, W. MCGUIRE, A. J. MCNAIR, M. S. PRIEST, L. REID, F. J. SPRY, R. Y. THATCHER, G. WINTER.

APPROVED MAJOR AND MINOR SUBJECTS

Drawing and Cartography 4	Sanitary Engineering 1, 2, 4
Geodetic and Photogrammetric Engineering 1, 2, 4	Sanitary Sciences 3, 4
Hydraulics 1, 2, 3, 4	Structural Engineering 1, 2, 3, 4
Hydraulic Engineering 1, 2, 3, 4	Soils Engineering 1, 2, 3, 4
Management Engineering 1, 2, 3, 4	Transportation Engineering 1, 2, 3, 4
	Aerial Photographic Studies 2, 3, 4

To be admitted for graduate study in any of the fields of civil engineering, an applicant should ordinarily hold a Bachelor's degree in civil engineering from a school of recognized standing. However, arrangements may be made for exceptional cases when a student with undergraduate training in a different field, such as another branch of engineering, architecture, or the physical sciences, wishes to pursue graduate work in civil engineering. In such cases, additional residence may be required by the candidate's Special Committee. To be admitted the applicant must have been in at least the upper half of his

class, or he must present other evidence which demonstrates his fitness to carry on graduate work.

The aim of graduate work in the studies grouped under civil engineering is not only to increase the student's proficiency in the more advanced phases of professional practice, but also to promote a deeper and broader understanding of the theoretical and empirical basis of the field, including in many cases the boundaries of present knowledge.

In addition to formal courses, individual work under personal direction by members of the staff is available.

DRAWING AND CARTOGRAPHY. The Department offers advanced drawing courses which may be adjusted to the needs of a particular student. Cartography and map reproduction are closely allied with the mapping requirements of topographers, geologists, and social scientists.

GEODETIC AND PHOTOGRAMMETRIC ENGINEERING. The Geodetic and Photogrammetric Engineering Department offers a considerable number of advanced courses in topographic engineering, geodesy and geodetic engineering, and photogrammetry and photogrammetric engineering. In addition, courses in related fields with special application to surveying problems are available in other departments of the University. Attention is directed to courses in astronomy, physics (optics and photography), mathematics, and geology (*Arts*), and in regional and city planning (*Arch.*)

HYDRAULICS AND HYDRAULIC ENGINEERING. The Department of Hydraulics and Hydraulic Engineering offers a complete sequence of advanced courses in theoretical and experimental hydraulics, covering the subjects of hydrodynamics, advanced hydraulics, flow in open channels, hydraulic measurements, hydraulic models, pumps and turbines. Courses listed in hydraulic engineering deal with hydraulic structures, water power, flood control, erosion and sedimentation, rivers and harbors. Formal teaching is supplemented by informal discussions, demonstrations, laboratory experiments, and field trips. Seminars are held regularly with the participation of the staff, of graduate students, and of distinguished visitors.

In the Hydraulic Laboratory facilities are available for research and thesis work. Not infrequently, graduate students find part-time employment on laboratory projects. The Elon Huntington Hooker Fellowship in Hydraulics is available for research in this field. Graduate students may broaden their education by work in the allied fields of structural engineering, soils engineering, mechanical engineering, aeronautical engineering, mathematics, etc.

MANAGEMENT ENGINEERING. Graduate study in management is intended to supplement the civil engineer's basic technical training with advanced studies in principles of management, economics, finance, and business law. These types of study are of importance in such work as public administration, regional planning, city management, public housing, and valuation, as well as for the efficient and successful management of industry, construction contracting, and other lines of business with which the engineer may be connected.

SANITARY ENGINEERING. The Department offers a number of formal advanced courses in water supply, sewerage, industrial wastes, public health, sanitary biology, and chemistry in addition to supervision of informal courses in design and subjects of interest to special students. For the engineering student interested in the contributing sciences, minor work is available both in chemistry, bacteriology, biology, and fluid mechanics. Special programs are arranged for students majoring in such subjects as conservation, medical entomology, nutrition, hydraulics, and chemical and other engineering fields.

STRUCTURAL ENGINEERING AND SOILS ENGINEERING. The Department of Structural and Soils Engineering offers a considerable number of advanced courses in the field of structural analysis and design, and in soils and foundation engineering. In addition, courses in the fields of elasticity, stability, plasticity, applied mathematics, engineering materials, and other subjects are available in the Department of Mechanics and Engineering Materials (*Engin.*) and in the Department of Mathematics (*Arts*). Courses on airplane structures are available in the Graduate School of Aeronautical Engineering. Courses in soils engineering may be supplemented by instruction in closely allied subjects such as Transportation (*Engin.*), Geology (*Arts*), and Agronomy (*Ag.*).

Experimental facilities include testing machines up to 400,000-pound capacity with height up to 20 feet, strain gage equipment of all current types, and special laboratories for structural model analysis and soil mechanics.

The Department regularly employs graduate students for assistance in theoretical and experimental work on research projects sponsored by government and private agencies.

TRANSPORTATION ENGINEERING. Four courses in highway engineering, two in traffic engineering, two in railroad engineering, and one in airport engineering, constitute the formal offerings. The staff also offers four courses in various branches of aerial photographic studies, including engineering soil survey, construction planning, ground water, agricultural surveys for irrigation in arid areas, and advanced work in mineral surveys. Important courses in related fields commonly include agricultural soils (*Ag.*), geology (*Arts*), regional planning (*Arch.*), statistics (*Arts, Engin.*) and transportation economics (*Engin.*).

Laboratories are available for graduate study and research in bituminous materials, aggregates, soils, and cements. Laboratory and field facilities in traffic engineering and aerial photographic studies are fully developed. Considerable emphasis is placed upon field work, and opportunities for practical experience are available in every phase of transportation. Part of the programs of students on leave from professional assignments may be adjusted to their special interests and research problems.

ELECTRICAL ENGINEERING (*ENGIN.*)

Professors P. D. ANKRUM, W. C. BALLARD, JR., H. G. BOOKER, N. H. BRYANT, L. A. BURCKMYER, C. R. BURROWS, C. L. COTTRELL, A. B. CREDLE, W. W. COTNER, A. E. DAVIES, W. H. ERICKSON, C. E. INGALLS, W. R. JONES, M. S. KELLY, S. LINKE, M. G. MALTI, H. S. MCGAUGHAN, M. S. MCILROY, T. MCLEAN, W. E. MESERVE, B. K. NORTHROP, R. E. OSBORN, J. L. ROSSON, H. G. SMITH, E. M. STRONG, J. G. Tarboux, P. D. TUTTLE, N. M. VRANA, R. D. WILSON, S. W. ZIMMERMAN.

APPROVED MAJOR AND MINOR SUBJECTS

Electric Power System Engineering

Transmission and Distribution 1, 2,	High Voltage Engineering 2, 3, 4
3, 4	Power Generation 2, 3, 4
System Stability 1, 2, 3, 4	Relaying and Control 2, 3, 4
Economics of Utilities 2, 3, 4	

Electric Power Utilization and Control

Electrical Machinery 1, 2, 3, 4	Industrial Electronics 1, 2, 3, 4
Industrial Control and Applications	Illumination Engineering 2, 3, 4
1, 2, 3, 4	Servomechanisms 1, 2, 3, 4

Communication Engineering

Communication Systems 1, 2, 3, 4	Wire Transmission 2, 3, 4
Electron Tubes 1, 2, 3, 4	Radio Engineering 1, 2, 3, 4
Electromagnetism 1, 2, 3, 4	Radio Wave Propagation 1, 2, 3, 4
Microwave Engineering 1, 2, 3, 4	Acoustical Engineering 2, 3, 4
Economics of Communication Services 2, 3, 4	Carrier Systems 2, 3, 4

General

Electric Circuit Analysis 1, 2, 3, 4	Materials in Electrical Engineering
Electrical Measurements 1, 2, 3, 4	2, 3, 4

As prerequisite for graduate work leading to the degree of M.S. or Ph.D. with major in the field of electrical engineering, the candidate should have had the equivalent of the fundamental work required by an accredited undergraduate curriculum in the area of his major subject. The candidate must also supply definite evidence of scholarly interest and aptitude for advanced study. Though the Graduate Record Examination is not required of applicants in the field of electrical engineering, applicants may well consider taking this examination, submitting its results along with their application for graduate work.

Considerable latitude is allowed in the selection of the minor subjects, provided that the entire program shows a unified purpose.

Adequate work in advanced physics and mathematics is required of candidates for the degree of Ph.D. It is highly recommended that at least one of the two minor subjects be chosen in the fields of physics or mathematics or in other related fields outside the field of electrical engineering.

In addition to the formal courses listed in the *Announcement of the College of Engineering*, members of the Faculty are prepared to guide individual students in special topics. Seminars may be arranged for students interested in closely related lines of study and research. Proficiency is expected in all phases of the graduate program including work in formal courses.

ENGINEERING MECHANICS (*ENGIN.*)

Professors H. D. Conway, E. T. CRANCH, T. R. CUYKENDALL, J. A. FAY, D. F. GUNDER, E. V. HOWELL, H. C. PERKINS, L. STEG.

APPROVED MAJOR AND MINOR SUBJECTS

Mechanics 1, 2, 3, 4	Fluid Mechanics 1, 2, 3, 4
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Graduate study in mechanics serves a twofold purpose. It trains men who intend to teach or to specialize in industrial research. The Faculty believes that both these groups are best served by a broad fundamental training. Although the work in this department is devoted primarily to the mechanics of particles and rigid bodies and of deformable solids, all students are encouraged to take work also in the fields of the mechanics of liquids and gases and in the related fields of materials, physics, and mathematics. Opportunity is provided for graduate students interested in teaching to participate in the teaching program in the University. Opportunity is likewise provided for those primarily interested in industrial research to participate in projects in this field. Candidates planning to complete a Master's degree in one year must have had advanced strength of materials (Engineering 1154) and applied mechanics (Engineering 1155) or the equivalent upon entering.

ENGINEERING MATERIALS (*ENGIN.*)

Professors D. F. GUNDER, J. O. Jeffrey, J. R. MOYNIHAN, H. S. SACK, F. O. SLATE, D. A. STUART.

APPROVED MAJOR AND MINOR SUBJECT

Materials of Engineering 1, 2, 3, 4

Engineering materials includes both theoretical and experimental procedures for evaluating the properties of engineering materials. All graduate students are urged to acquire fundamental training in both of these phases. In addition to the courses of the department, many other courses in mechanics and metallurgy (*Engin.*) and physics (*Arts*) should be considered as appropriate and necessary supplements in an adequate training in the field of materials engineering. Laboratory facilities are available for investigations in metals, concrete, cement, concrete aggregate, timber, plastics, fuels, lubricants, and miscellaneous materials.

ENGINEERING PHYSICS (*ENGIN.*)

Professors H. G. BOOKER, C. R. BURROWS, D. R. CORSON, A. B. CREDLE, T. R. CUYKENDALL, G. E. GRANTHAM, D. F. GUNDER, P. L. HARTMAN, M. KAC, A. R. KANTROWITZ, H. S. SACK, W. R. SEARS, B. M. SIEGEL, L. P. Smith.

APPROVED MAJOR AND MINOR SUBJECT

Engineering Physics 1, 2, 4

The aim of graduate work in engineering physics is concentrated work in a field which crosses conventional subject matter boundaries as well as deepens and enlarges the general scientific and engineering background of the student. For this reason, the minor subject or subjects must be chosen from subjects outside the field approved by the chairman of the Special Committee.

The thesis can be done in any field represented by members of the engineering physics Faculty, or, if the candidate's Special Committee approves, in other fields in which engineering physics may be significant. Course work will be chosen from the graduate courses offered in the College of Engineering (*Engin.*) or in the Departments of Physics, Chemistry, or Mathematics (*Arts*). The Special Committee will advise the student in the choice of these courses. The Faculty conducts research in a variety of fields, in particular, electromicroscopy, its applications and related electron optics, and the fundamentals of anelasticity of materials.

GEOLOGY AND GEOGRAPHY (*ARTS*)

Professors A. L. ANDERSON, J. D. BURFOOT, JR., W. S. Cole, W. T. HOLSER, C. M. NEVIN, J. W. WELLS.

APPROVED MAJOR AND MINOR SUBJECTS

Mineralogy 1, 2, 3, 4	Glacial Geology 1, 2, 3, 4
Mineralogy and Petrology 1, 2, 3, 4	Structural Geology 1, 2, 3, 4
Economic Geology 1, 2, 3, 4	Stratigraphy 1, 2, 3, 4
Paleontology 1, 2, 3, 4	Sedimentation 1, 2, 3, 4
Paleontology and Stratigraphy 3	Geology 4
Petrology 1, 2, 3, 4	Geography 1, 2, 3, 4
Geomorphology 1, 2, 3, 4	

Language requirement for the Master's degree: proficiency in French or German or an approved substitute.

Graduate work in geology may include investigation, under approved direction, in the field away from Ithaca.

MATHEMATICS (ARTS)

Professors R. P. AGNEW, W. H. J. FUCHS, G. A. HUNT, W. A. HURWITZ, M. KAC, P. OLUM, H. POLLARD (on leave), J. B. ROSSER, A. S. SHAPIRO, R. J. Walker, J. WOLFOWITZ (on leave), B. YOOD.

APPROVED MAJOR AND MINOR SUBJECTS

Algebra 1, 2, 3

Applied Mathematics 2, 3

Analysis 1, 2, 3

Mathematics 1, 2, 4

Geometry 1, 2, 3

Language requirement for the Master's degree: proficiency in French or German or an approved substitute.

Prerequisites for candidacy are the equivalent of the elementary course in analytic geometry and calculus and further study in at least one more advanced subject, as, for example, differential equations, advanced calculus, modern algebra, or projective or advanced analytic geometry.

Candidates for the Master's degree are expected to attain some understanding of modern mathematical thought. Qualifications for the Doctor's degree include a broad acquaintance with the basic subjects of present-day mathematics plus a demonstration of ability to do research in one or more branches of mathematics. In addition to the more commonly recognized branches, the Department offers programs of advanced study and research in symbolic logic and in probability and statistics.

MECHANICAL ENGINEERING (ENGIN.)

Professors W. C. ANDRAE, A. H. BURR, R. E. CLARK, S. F. CLEARY, B. J. CONTA, D. DROPKIN, G. B. DUBOIS, F. S. ERDMAN, H. N. FAIRCHILD, N. R. GAY, R. L. GEER, G. F. HANSELMAN, E. K. HENRIKSEN, I. KATZ, H. J. Loberg, H. H. MABIE, C. O. MACKEY, C. I. MILLARD, E. S. MONROE, F. OCVRK, R. M. PHELAN, M. W. SAMPSON, B. W. SAUNDERS, A. SCHULTZ, JR., D. G. SHEPHERD, E. B. WATSON, K. C. WHITE.

APPROVED MAJOR AND MINOR SUBJECTS

Administrative Engineering 1, 2, 3, 4

Industrial Engineering 1, 2, 3, 4

Automotive Engineering 1, 2, 4

Machine Design 1, 2, 3, 4

Engineering Drawing 1, 2, 3, 4

Materials Processing 1, 2, 3, 4

Heat-Power Engineering 1, 2, 3, 4

As prerequisite for graduate study in mechanical engineering, the student should have the equivalent of the courses in his major field that are required of undergraduates in mechanical engineering at Cornell. These courses are described in the *Announcement of the College of Engineering*. Those lacking the full equivalent of this training may be required to take one or more of these undergraduate courses or to do assigned work to make up the deficiency.

There are five departments in the Sibley School of Mechanical Engineering.

Graduate work is not confined to these specific departments although major and minor subjects tend to coincide with departmental titles.

HEAT-POWER ENGINEERING. There are opportunities for both analytical and experimental studies at the graduate level in heat-power engineering. Opportunities for analytical studies include the fields of thermodynamics, heat transfer, combustion, fluid flow, power plants, refrigeration, and air conditioning. In the laboratories of the Sibley School of Mechanical Engineering, experimental studies at the graduate level may be made of internal combustion engines, gas turbines, steam engines, steam turbines, pumps, compressors, fans, steam generating units, heat exchange apparatus, refrigerating equipment, air conditioning equipment, and engineering instruments. By proper choice of his minor fields of study, the heat-power major may acquaint himself with closely related sciences, such as chemistry, physics, and mathematics, or with engineering courses in the other departments of the school and college.

MACHINE DESIGN. Unique instruction is offered in design and related subjects without duplication of work offered by other departments. The thesis and related courses may be concentrated in one of the following three fields or may overlap them: (1) design and development of a machine or component, (2) theoretical analysis of machine or component performance, including stress and vibration, and (3) an experimental investigation of performance. For the latter the department has its own laboratory, well equipped with the tools of experimental stress analysis, and instruments and machines of vibration analysis, bearing lubrication performance, and wear testing. Courses are offered on the subjects of creative design, automatic machinery, advanced design analysis, advanced kinematics, design problems in vibration and dynamics, automotive engineering, and machine design experimental laboratory. Special interests of the staff include the lubrication and performance of bearings under high speeds and dynamic and misaligning loads, gearing, impact stresses in machinery parts, endurance of shafts in machinery assemblies, and residual stresses. Students who major or minor in machine design usually take their other work in engineering mechanics, materials, materials processing, heat-power engineering, or industrial and engineering administration.

INDUSTRIAL AND ENGINEERING ADMINISTRATION. Graduate training has two objectives: (1) to develop exceptional abilities in specific fields of industrial and engineering administration, and (2) to develop balanced training in the factors that are related to this specialization. This includes the choice and arrangement of necessary equipment, the determination of the required number of operators, and the flow of materials in time and space; the design of shipping and storage operations, control systems, and office procedures; the business structure and the broader economic and social variables affecting it. Aspects of economy and potential dollar return are stressed wherever feasible.

MATERIALS PROCESSING. A general survey on the advanced level will serve as the foundation for work on individual problems dealing with the principal features and specific details of machine tools, cutting tools, machinability of materials, work and tool holding devices, and gaging and inspecting methods. The laboratory provides modern and unique facilities for measuring performance and efficiency of machines, tools and accessories, testing and inspecting of equipment and parts, experimental investigations of new methods, and participation in research projects.

ENGINEERING DRAWING. Individual attention is available to students wishing to do research and development work in industrial applications and teaching.

METALLURGICAL ENGINEERING (ENGIN.)

Professors M. S. BURTON, J. L. GREGG, P. E. Kyle, C. W. MASON.

APPROVED MAJOR AND MINOR SUBJECTS

Metallurgical Engineering 1, 2, 4

To qualify for admission, a student must have completed satisfactorily a course substantially equivalent in its technical content to the course leading to the degree of Bachelor of Metallurgical Engineering at Cornell University. Exact equivalency, subject for subject and credit hour for credit hour, is neither required nor expected, but the previous training must be such as to prepare the applicant for effective work in metallurgical engineering at the graduate level.

Minor subjects must be chosen, for example, from chemical engineering or other divisions of engineering, chemistry, physics, mathematics, business and public administration, or industrial and labor relations.

Candidates are expected to pursue a course of study that will give them a deeper understanding of the basic and applied sciences and will develop initiative and originality. Specific programs are planned to fit the objectives of the student and to develop original thinking. The student is not required to take any fixed series of courses; he can complete much of his graduate program through individually supervised work with members of the Faculty.

Research work for the thesis may be in specific fields of unit processes, process metallurgy, metallography, physical metallurgy, and foundry engineering.

PHYSICS (ARTS)

Professors L. L. BARNES, H. A. BETHE, G. COCCONI, D. R. CORSON, (T. R. CUYKENDALL, Engineering Physics), J. W. DE WIRE, F. J. DYSON, C. W. GARTLEIN, G. E. GRANTHAM, K. I. GREISEN, P. L. HARTMAN, J. A. Krumhansl, B. D. McDANIEL, F. L. MOORE, P. MORRISON, H. F. NEWHALL, L. G. PARRATT, (H. S. SACK, Engineering Physics), N. SCHWARTZ, (B. SIEGEL, Engineering Physics), L. P. SMITH (Chairman), R. L. SPROULL, D. H. TOMBOULIAN, R. R. WILSON, and W. W. WOODWARD.

APPROVED MAJOR AND MINOR SUBJECTS

Physics 1, 2, 3, 4

Theoretical Physics 1, 2, 3, 4

Experimental Physics 1, 2, 3, 4

Biophysics 3, 4

Language requirement for the Master's degree: proficiency in French or German or an approved substitute before completion of the second residence unit.

The major and both minor subjects for the doctorate should not be chosen inside the field of physics.

The major subject for the doctorate may be called experimental physics only if accompanied by theoretical physics as a minor, and theoretical physics only if accompanied by experimental physics as a minor.

The major subject for the Master's degree must be in physics; the minor subject may or may not be in the field of physics.

Members of the staff are especially interested in directing graduate research in the following fields:

EXPERIMENTAL PHYSICS. Nuclear physics; cosmic rays, atomic spectra; X-ray spectra; physical electronics; and physics of solids.

THEORETICAL PHYSICS. Quantum mechanics; quantum electrodynamics; theory of nuclei; fundamental particles; radiation; and the theory of the solid state.

A colloquium in general physics and a seminar in theoretical physics meet regularly, and seminars in special fields as arranged.

A booklet entitled *Graduate Work in Physics at Cornell* can be obtained by writing to the Chairman, Department of Physics, Rockefeller Hall. The booklet contains additional information about graduate work and research in physics for the entering graduate student.

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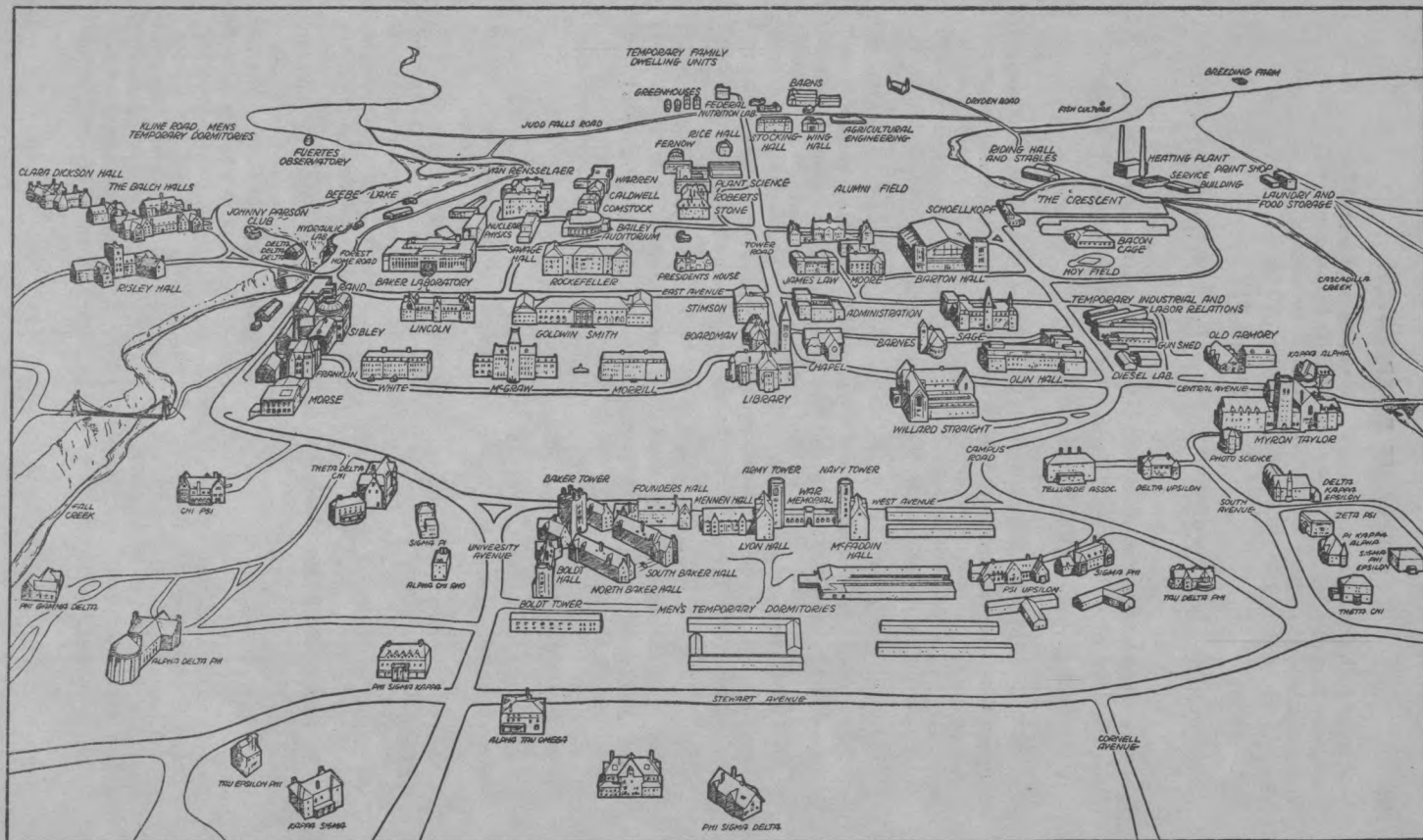
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